BONNIE LAKE MANAGEMENT STUDY
BACKGROUND REPORT
1987

Report Finalized - October, 1987

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PREPARED FOR THE COUNCIL OF THE COUNTY OF SMOKY LAKE
BY THE BONNIE LAKE PLAN COMMITTEE

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Part A - Introduction

BACKGROUND

In 1984, Alberta Municipal Affairs completed a study of the lakes in the Lakeland Region of Northeastern Alberta. The study, called the Lake Planning Framework, evaluated and classified each lake according to its capability to support recreational activity. Bonnie Lake was rated as having the potential to be used for intensive recreational facilities such as camping, swimming, or country residences. The Lake Planning Framework also recommended that a more detailed Lake Management Study be completed prior to any further development occurring at the lake.

Early in 1986 the possibility of a new multi-lot country residential subdivision at Bonnie Lake surfaced. Council initiated the Bonnie Lake Management Study in response to this potential development. The Lake Study will assist Council in making future development decisions at the lake.

In June 1986, County Council established a local committee to work on the study and requested assistance from Alberta Municipal Affairs. In the first phase of the lake study, the Committee gathered information on Bonnie Lake's physical resources, use, and development potential. This information is contained in the Background Report. In the second phase of the planning process, the Committee will prepare an Area Structure Plan consisting of guidelines for future development at the lake. The Committee will then present the plan to Council for adoption. The opportunity for public involvement has been provided for throughout the planning process.

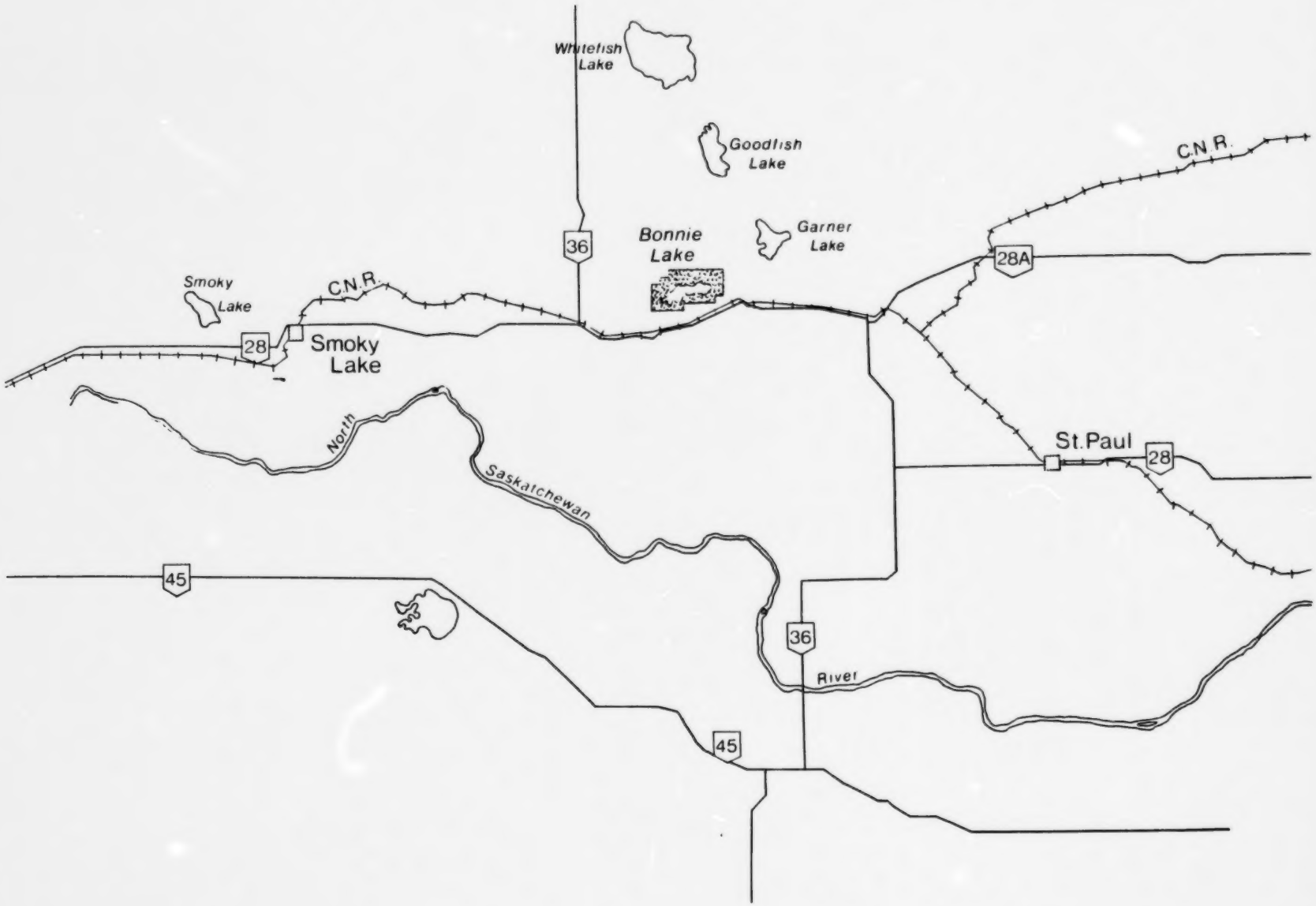
THE STUDY AREA

Bonnie Lake is located in the County of Smoky Lake No. 13, approximately 100 miles (160 km) northeast of Edmonton. The lake is 2 miles (3.2 km) north of Highway 28, and 1.5 miles (2.4 km) east of Vilna. The regional setting of Bonnie Lake is shown on Map 1.

In addition to being the source of drinking water for the Village of Vilna, Bonnie Lake is also the site for a variety of recreational uses. Major developments at the lake include a provincial campsite, a multi-lot country residential subdivision, a golf course, and County campsite. Crop and livestock production also occur in the study area. The study area is described on Map 2.

Map 1

Regional Setting



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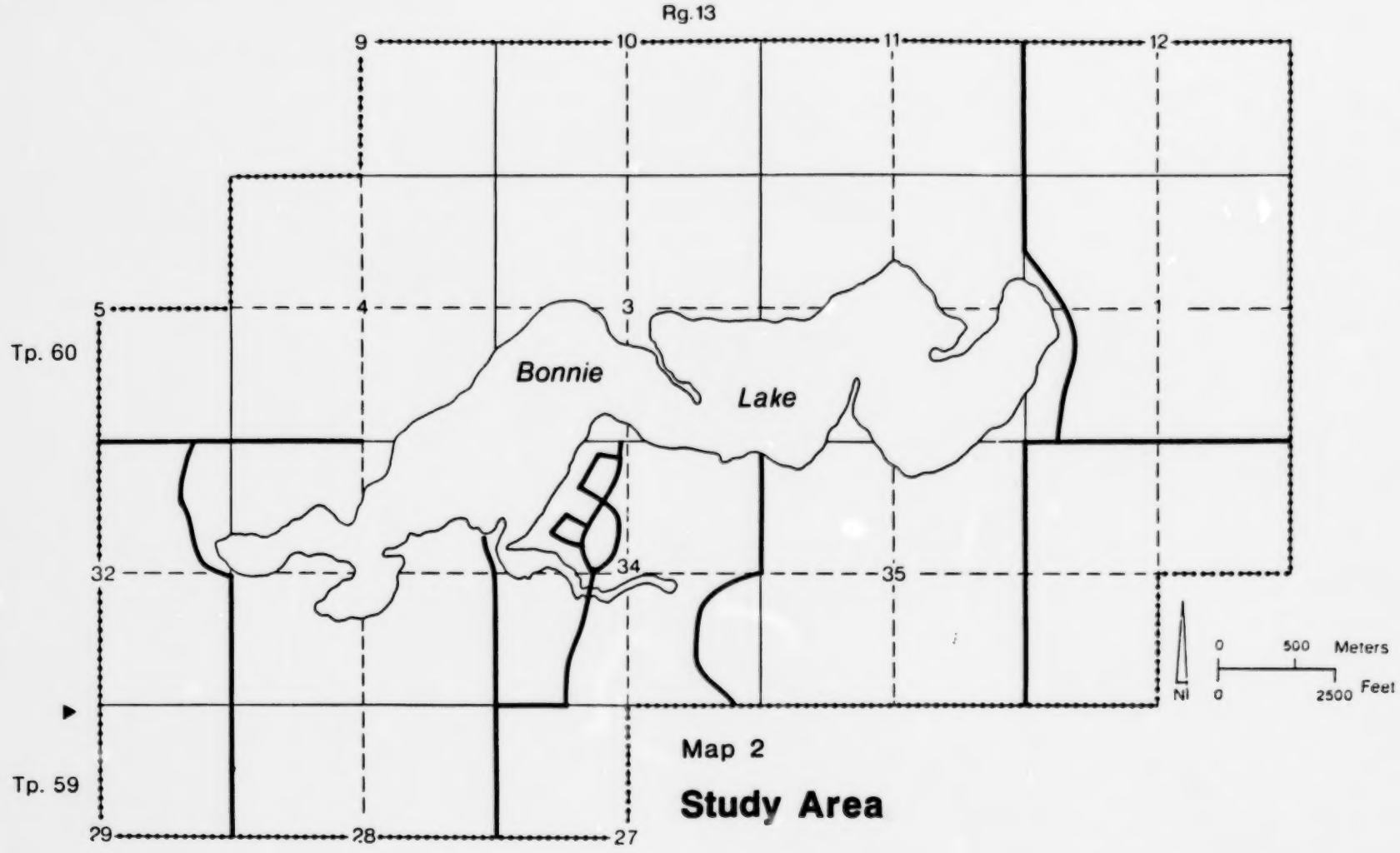


Map 2

Study Area

····· Study area boundary

Part B - Resource Inventory and Evaluation

LAKE FACTS

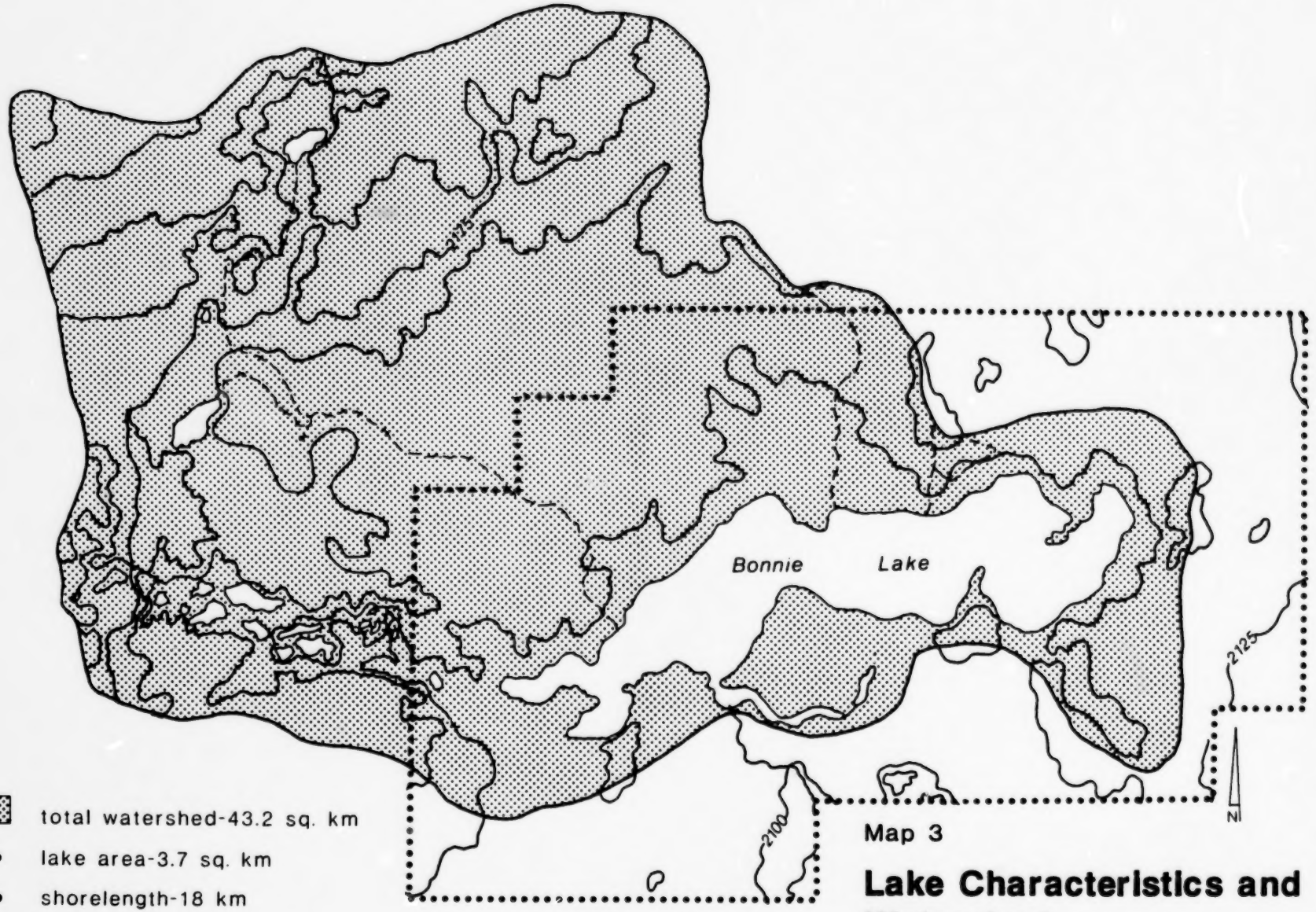
Bonnie Lake is a relatively small lake with a total area of 968 acres (392 ha) and an average depth of 10 feet (3 m). Maximum lake depth is 25 feet (7.6m). The lake has no permanent inlets and its outlets appear to be intermittent. The residence time, or filling time, is approximately 15.1 years. However, the effective flushing rate is probably very low due to minimal outflow. This is a significant characteristic because lakes which are poorly flushed are considered to be more susceptible to increases in external nutrient inputs.

According to Alberta Environment, current lake levels are low, but appear to be within the historical 2 to 3 foot (.6 to 1m) range in natural lake level fluctuations. The County and Alberta Environment have initiated a study to determine the feasibility of stabilizing or raising lake levels at Bonnie Lake. The impact of the municipal water withdrawal by the Town of Vilna (50 acre feet per year) has been examined. Total annual withdrawal would draw off less than 1 inch (2.5 cm) of water off the lake surface. Natural surface evaporation loss is estimated to be 1 to 1½ feet (.3 to .5m) per year.

Maps 3 & 4 contain information on watershed area, shoreline length, lake surface area, and lake depths.

WATER QUALITY

The level of nutrients in a lake are an important indication of water quality. Nutrients are released into lakes from sources such as agricultural runoff, livestock waste, and atmospheric deposition. When the level of nutrients in a lake rises, the lake becomes more fertile and produces an increased amount of plant growth. When the plant growth dies, the process of decomposition consumes oxygen from the water and in turn releases more nutrients into the lake. As the cycle continues, the amount of oxygen in the water decreases and the amount of plant and algae growth increases. This process is called "eutrophication". A lake which is fully eutrophic is characterized by an excessive amount of plant and algal growth and a low supply of oxygen. Because of the deficient oxygen supply in eutrophic lakes, only hardy species of fish, such as Northern Pike, survive. Low oxygen levels increase the occurance of fish kills during winter. When ice forms on a lake, normal reoxygenation at the water surface ceases, while oxygen depletion continues through the water column, creating a deficit, which if large enough, can cause fish to die. The problem of a critical overwintering capability is compounded if the lake is shallow since there is less water available to the fish.

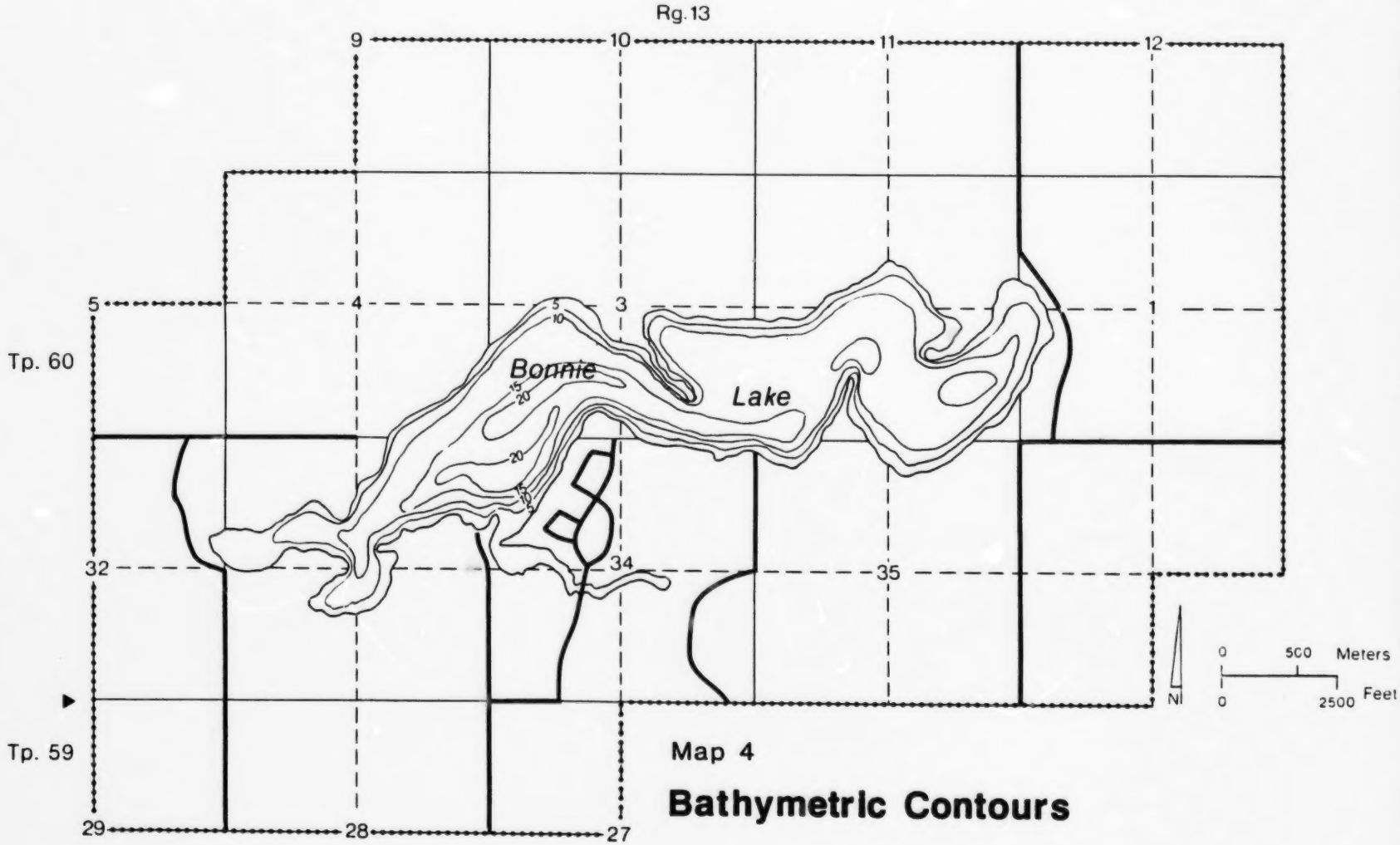


- total watershed-43.2 sq. km
- lake area-3.7 sq. km
- shorelength-18 km
- 5.5 km from SE to NE
- 1 km at widest points

Map 3

Lake Characteristics and Watershed

Source Alberta Environment



Map 4

Bathymetric Contours

maximum depth 25 feet (7.6m)

average depth 10 feet (3m)

contours shown in feet

Source: Alberta Environment

Bonnie Lake has a nutrient/fertility level which results in the production of a moderate amount of plant and algal growth. The term "mesotrophic" is used to describe a moderately productive lake. Mesotrophic lakes such as Bonnie Lake will have occasional algae blooms but will normally be suitable for recreational activities. The mesotrophic status of the lake was determined by water quality tests done in 1983-84. Alberta Environment sampled the water at Bonnie Lake nine times during the open water season of 1983 and once in the winter of 1984. The water quality research involved estimating the amount and source of nutrients (phosphorus) entering Bonnie Lake. A detailed nutrient loading breakdown for the lake is contained in Appendix 1.

The data collected by Alberta Environment suggests that agricultural land use is the major component of external nutrient supply (approximately 30% of the drainage basin is presently in agricultural use). One hundred and eleven cottages, by comparison, would contribute a much less significant proportion of the total. With more stringent controls on sewage disposal methods, the cottage loading could become negligible.

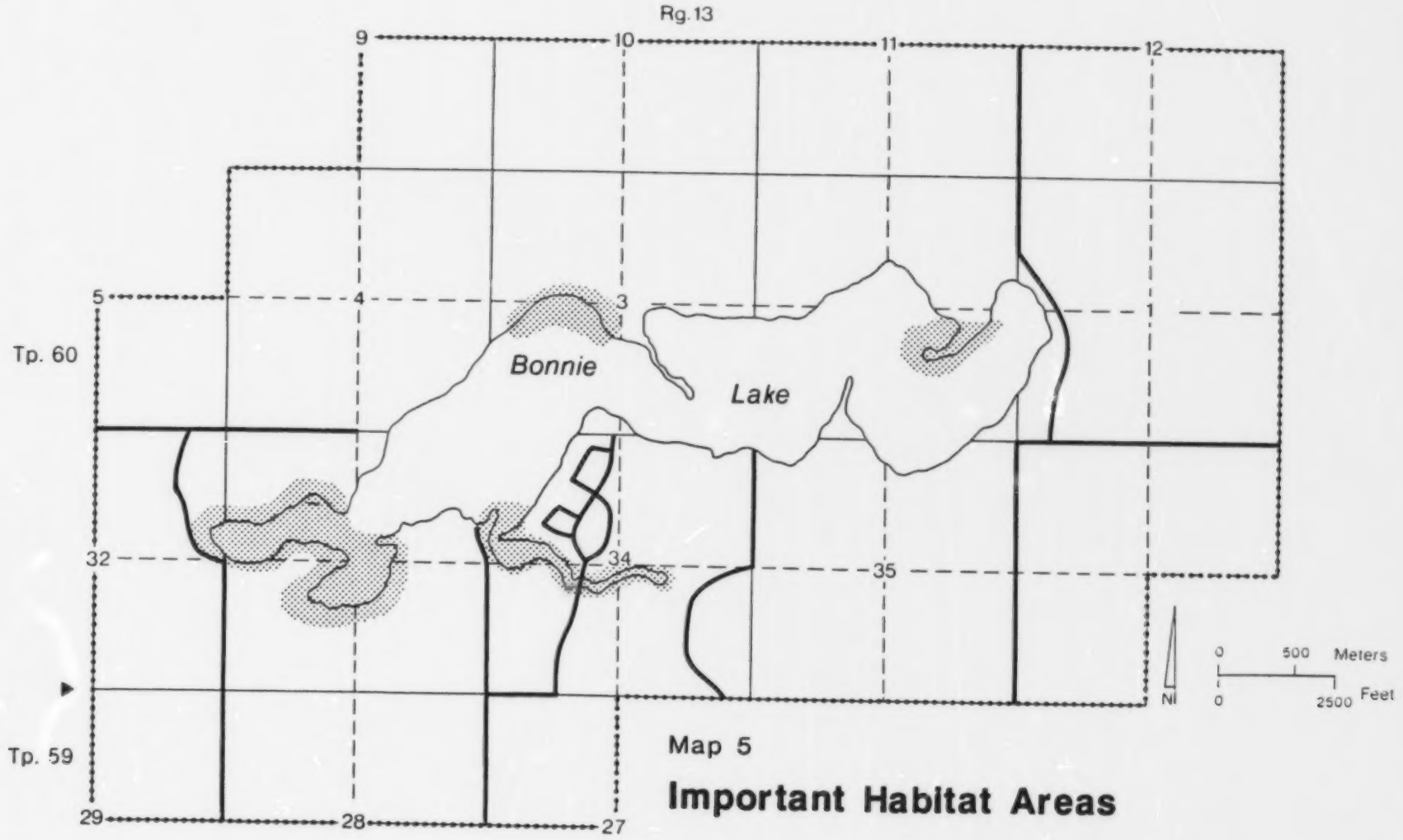
Increased nutrient inputs, particularly from agricultural development, will stimulate plant growth and diminish the aesthetic value of the lake. Increased plant growth would also exacerbate the already critical overwintering capability of the lake for fish. Any increase in the nutrient supply entering the lake will have a negative impact on lake water quality since the flushing rate is particularly slow.

FISH AND WILDLIFE

Bonnie Lake is located on the western edge of an extensive lakeland area. This lakeland area is important for the production and staging of waterfowl, as well as for the support of beaver, muskrat, and mink. The regional habitat biologist from Alberta Forestry, Lands and Wildlife notes that while the aquatic wildlife value of Bonnie Lake is good, it is not exceptional. Map 5 shows a number of marshy bays which support muskrat, beaver, and a variety of waterfowl species.

The Canada Land Inventory rates Bonnie Lake as having moderate limitations for the production of waterfowl. Production is limited by water depth and a reduced marsh edge. There is a low area south of the lake which is rated as having only slight limitations for the production of waterfowl. Limitations here are related to adverse topography and a lack of soil nutrients. Map 6 shows the Canada Land Inventory ratings for waterfowl in the study area.

There is a large forested area north of the lake. Some clearing has occured and this provides a desirable habitat for white-tailed deer. Wildlife habitat elsewhere in the study area is limited by the extensive clearing of land for farming. Most of the study area has a Canada Land Inventory rating of class four for the production of ungulates (Map 7). This means that the area has moderate limitations to ungulate production. The limitations are related to poor landform distribution and adverse topography.

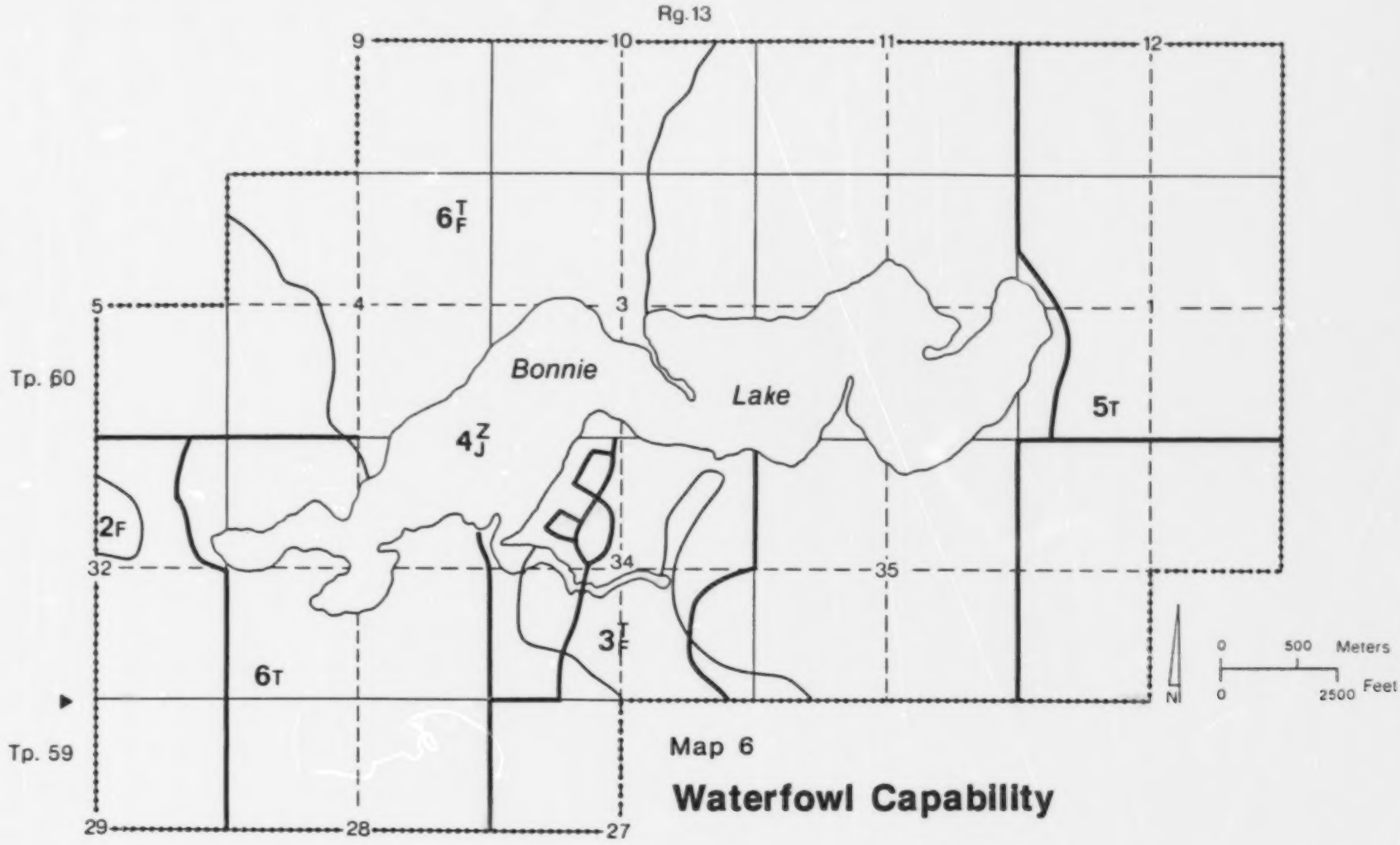


Map 5

Important Habitat Areas

habitat areas

Source Regional Habitat Biolo
Forestry, Lands and Wil

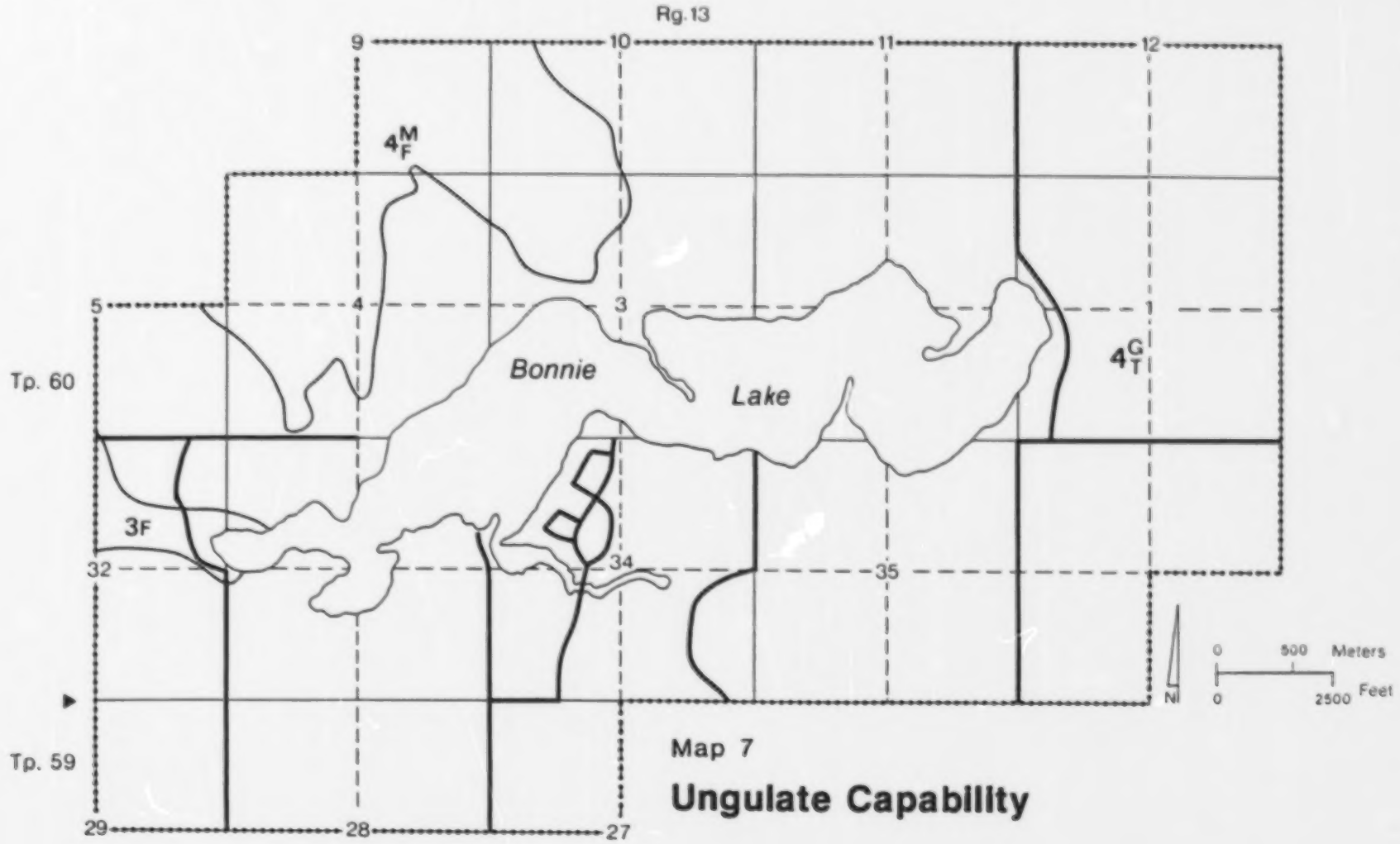


Map 6

Waterfowl Capability

2	very slight capability	T	adverse topography
3	slight limitations	F	lack of soil nutrients
4	moderate limitations	Z	water depth
5	moderately severe limitations	J	reduced marsh edge
6	severe limitations		

Source Canada Land Inventory



Map 7

Ungulate Capability

3 slight limitations
4 moderate limitations

G poor landform distribution
T adverse topography
M soil moisture
F lack of soil nutrients

Source Canada Land Inven

Bonnie Lake supports a moderate population of yellow perch, northern pike, and white suckers. The marshy areas of emergent vegetation provide fish habitat. These important areas are shown on Map 5. The production of fish is likely limited because of the lake water's low oxygen level in winter. Both minor and major fish kills have occured at Bonnie Lake. The lake has not been commercially fished since 1944/45.

FORESTRY

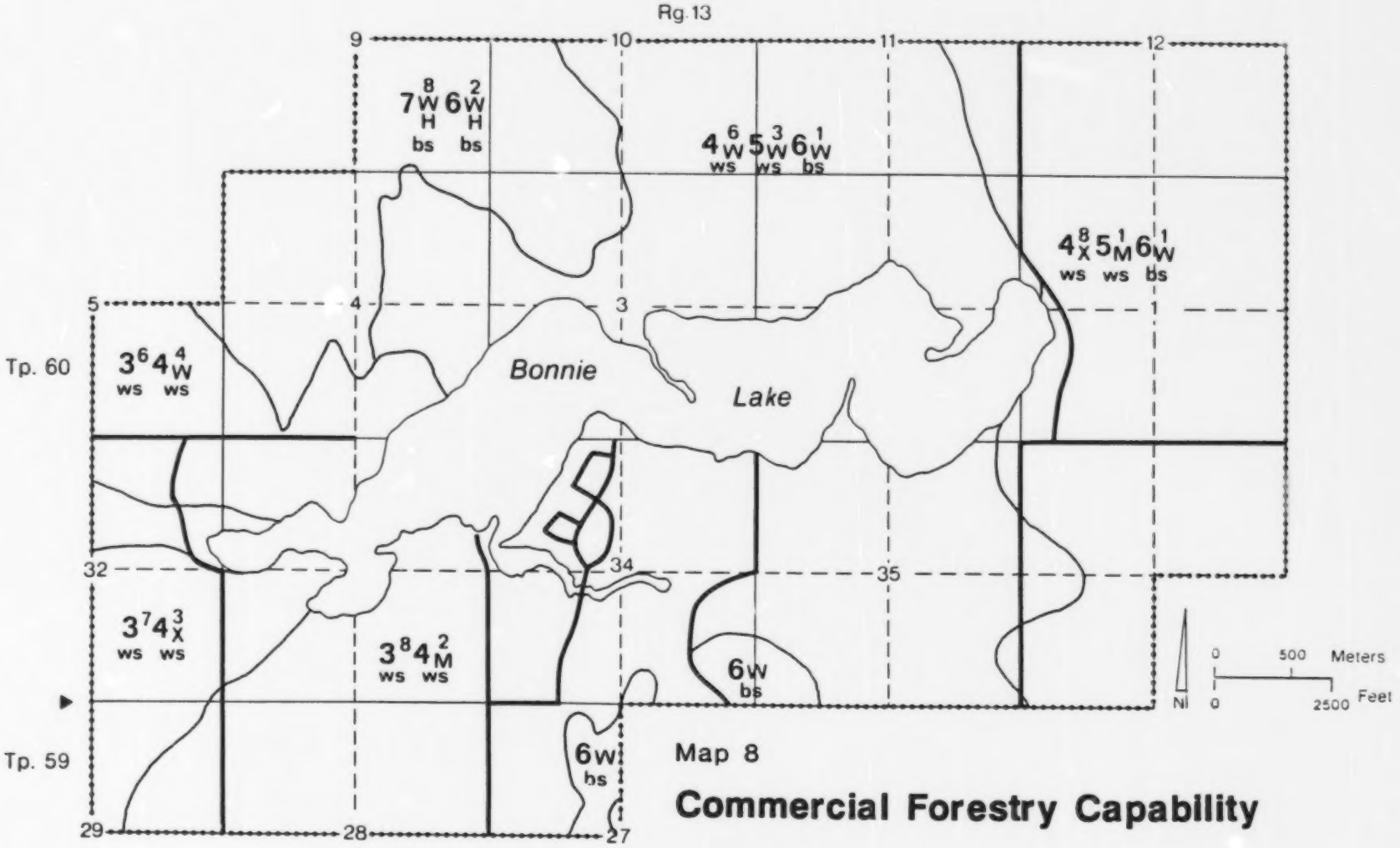
The study area lies within the mixed wood forest section of Canada's boreal forest region. Aspen and White Spruce are the major tree species found in the Study Area. According to the Canada Land Inventory the area south of Bonnie Lake has moderate limitations to the growth of commercial forests. The majority of this southern area has been cleared for agriculture. The treed area north of the lake is included in an area rated as having moderately severe limitations to the growth of commercial forests. These limitations are related to excessive soil moisture. Map 8 shows the detailed CLI classification for commercial forestry capability.

AGRICULTURE

Two methods have been used to evaluate the agricultural resources within the Bonnie Lake study area: the Canada Land Inventory and the Farmland Assessment Rating.

According to the Canada Land Inventory, the majority of land area surrounding the lake is rated as having Class 4 soils (Map 9). These soils are capable of sustaining cultivated field crops, but with a fairly low productivity. Pockets of higher capability Class 2 and 3 soils are concentrated south and southwest of the lake.

The farmland assessment rating (Map 10) also provides a means of evaluating the agricultural productivity of cultivated land in terms of its arable crop production. The land is assessed on the basis of topography, stoniness and various soil factors, with the final rating expressed as a percentage of productivity relative to the best farmland in Alberta. This best farmland is rated at 100%. Approximately half of the study area is under cultivation, most of it concentrated south of the lake. Cultivated areas south and east of Bonnie Lake fall within a productivity range of 30% to 40%. Cultivated areas southwest of the lake have a productivity rating over 40%.

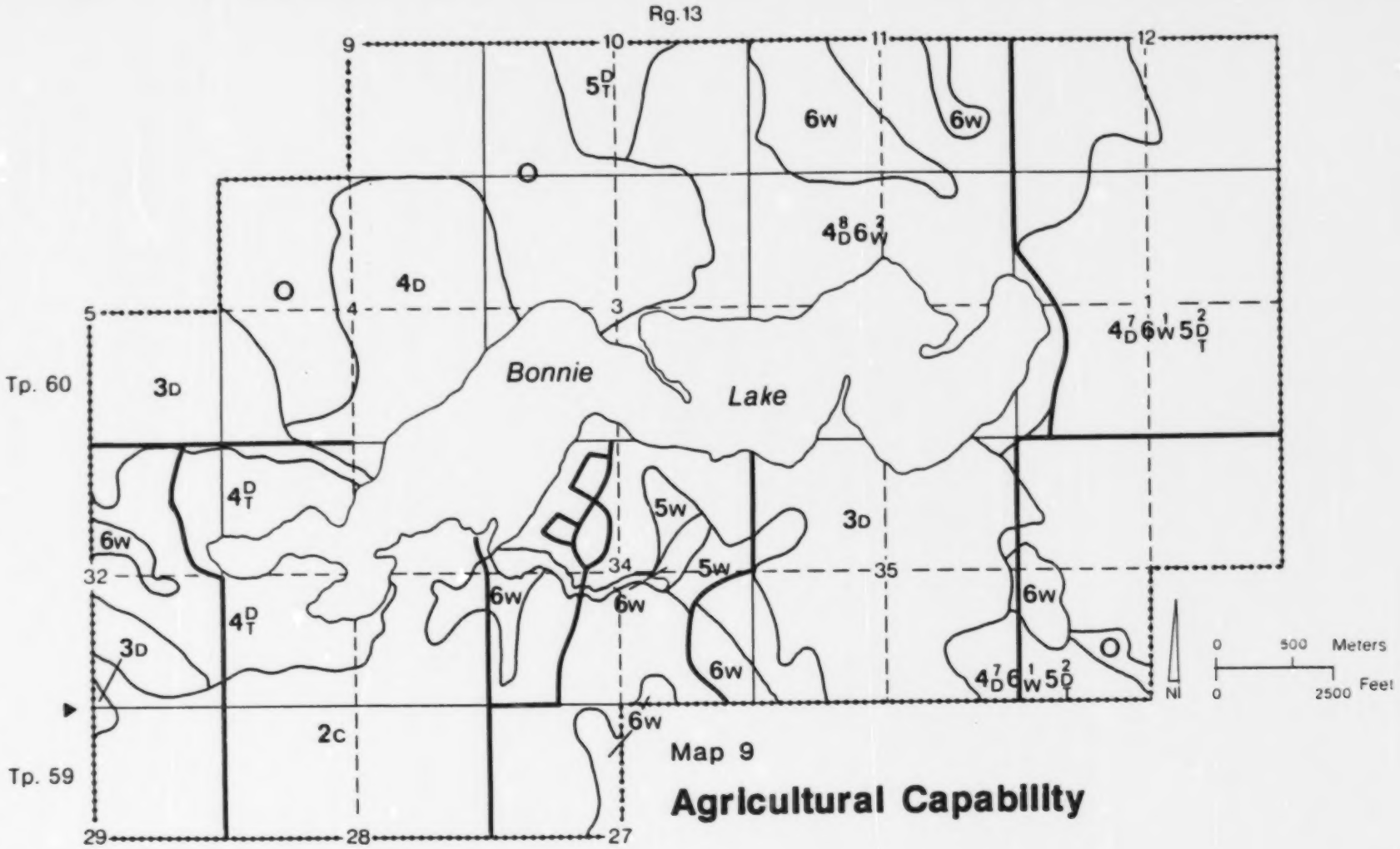


Map 8

Commercial Forestry Capability

3	moderate limitations	W	excess soil moisture
4	moderately severe limitations	X	a pattern of M and W
5	severe limitations	M	deficient soil moisture
6	very severe limitations	H	temperature too low
7	no forest capability		

ws	white spruce
bs	blue spruce



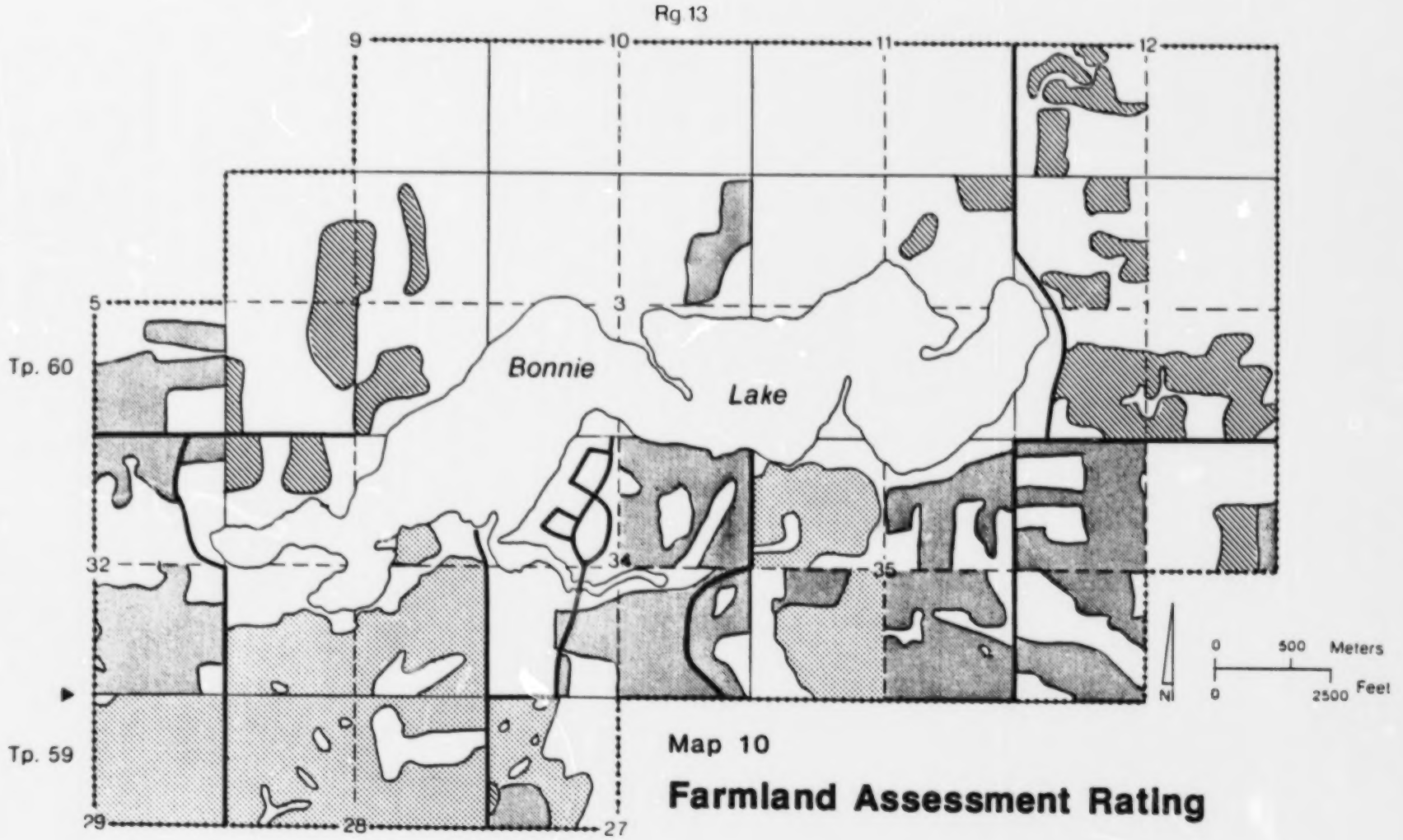
Map 9

Agricultural Capability

2	moderate limitations
3	moderately severe limitations
4	severe limitations
5	very severe limitations
6	capable only of producing perennial forage crops
O	organic soils

D	adverse climate
W	excess water
T	adverse topography

Source Canada Land Inventory



Map 10

Farmland Assessment Rating

20 - 29%

30 - 39%

> 40%

no rating

Source Farmland Assessment Record
County of Smoky Lak

RECREATION

Much of the southern shore is rated by the Canada Land Inventory as having a moderate capability for outdoor recreation with some areas being capable of supporting beach activities. Most of the southerly and westerly shoreline areas of the lake are characterized by steep slopes/banks, which limit recreational opportunities (Map 15). A small section of Class 3 beach is found where the provincial campsite is located. This is the highest rating at Bonnie Lake. The north and west shores have only a moderately low capability for outdoor recreation. Map 11 contains detailed recreation capability information.

Field survey confirms that much of the southern shore of Bonnie Lake has both a good quality wet and dry beach for recreational use. There are developed beaches at the provincial campsite and Bonnie Lake Resorts. There appears to be a high quality beach at the southeast end of the lake. The water is shallow in this area and the wet beach is hardpacked sand with relatively few weeds.

SOIL SUITABILITIES

The Soil Survey and Land Suitability Evaluation of the Bonnie Lake Study Area was prepared for Alberta Environment by Pedology Consultants in March, 1984. The report evaluated soil characteristics under various slope conditions to determine their suitability for recreational use, on-site sewage disposal and country residential development. The results are summarized on Maps 12 to 14 (refer to the aforementioned Study for detailed information). Slope conditions are shown on Map 15.

The limitation ratings used in the maps are:

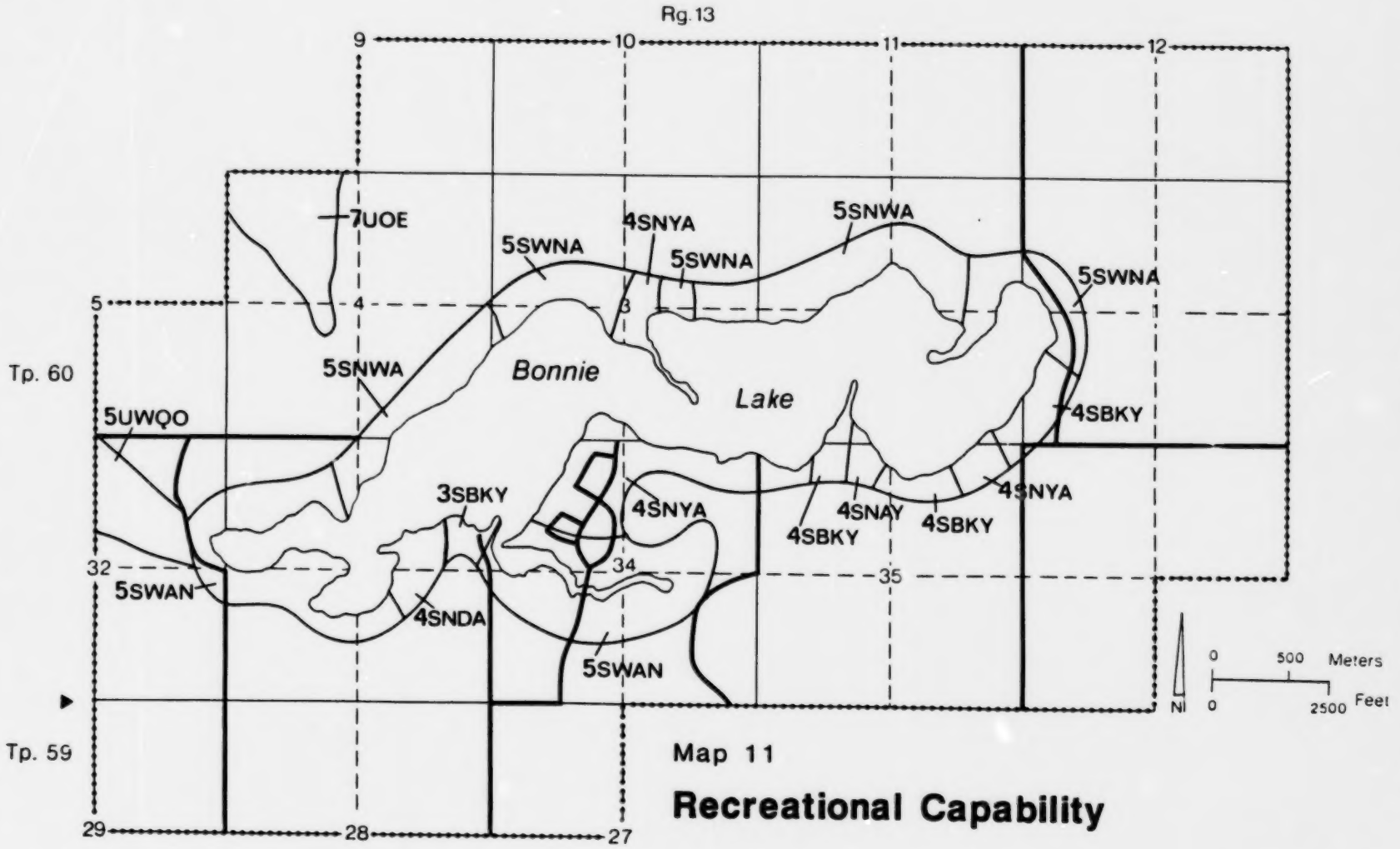
> none to slight - minor limitation which can be overcome easily;
> moderate - the limitation can be overcome or modified by special planning, design or maintenance;
> severe - one or more limitations exist and major soil modifications, special design or intensive maintenance is needed to overcome the limitation.

RECREATION (Map 12): The information shown on this Map pertains to camping, picnicking, and hiking. Most of the study area is suitable for hiking and cross-country skiing. Such activities require very little site development.

> Camping refers to a campsite with limited vehicular traffic and little site preparation. Site development would consist of only minimal shaping and leveling for tent areas and gravelling for parking areas. Fire pits, garbage disposal, and toilet facilities are included.
>
> Picnicking refers to a park type area with vehicular access confined to a parking area.

ON-SITE SEWAGE DISPOSAL (Map 13): A septic tank absorption field is a subsurface tile system designed to evenly distribute effluent so it can be absorbed into the ground. The information on the map is based on limitations for absorption.

COUNTRY RESIDENCES WITH OR WITHOUT BASEMENTS (Map 14): The map shows a rating for the construction and maintenance of single family dwellings and other low buildings with similar foundation needs.

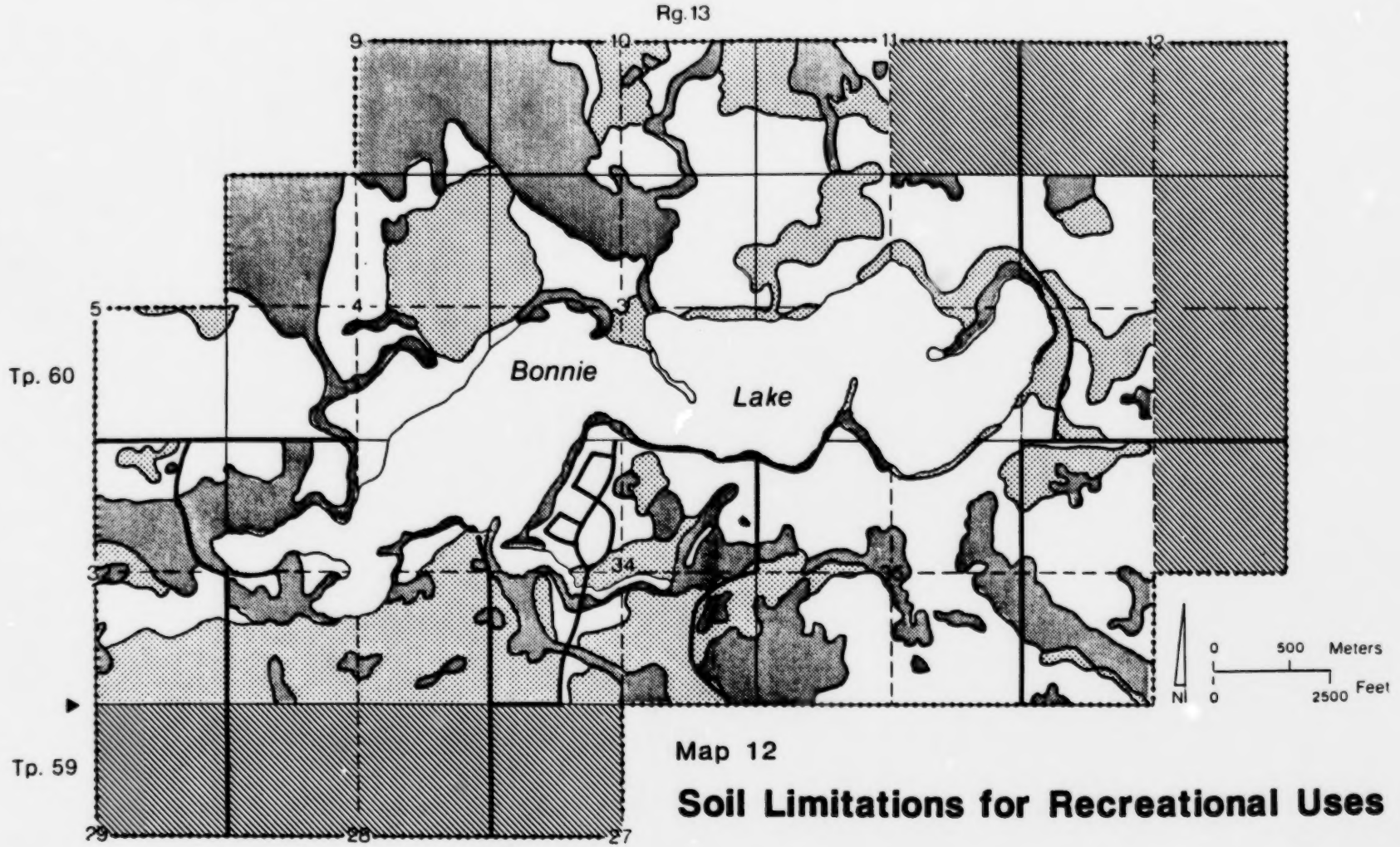


Map 11

Recreational Capability

3	moderately high capability	A	angling
4	moderate capability	Y	boating
5	moderately low capability	B	beach activities
7	no recreational capability	K	camping
		D	deep inshore water
S	skiing		
W	viewing wetland habitat		
N	lodging/cottaging		

Source: Canada Land Inve

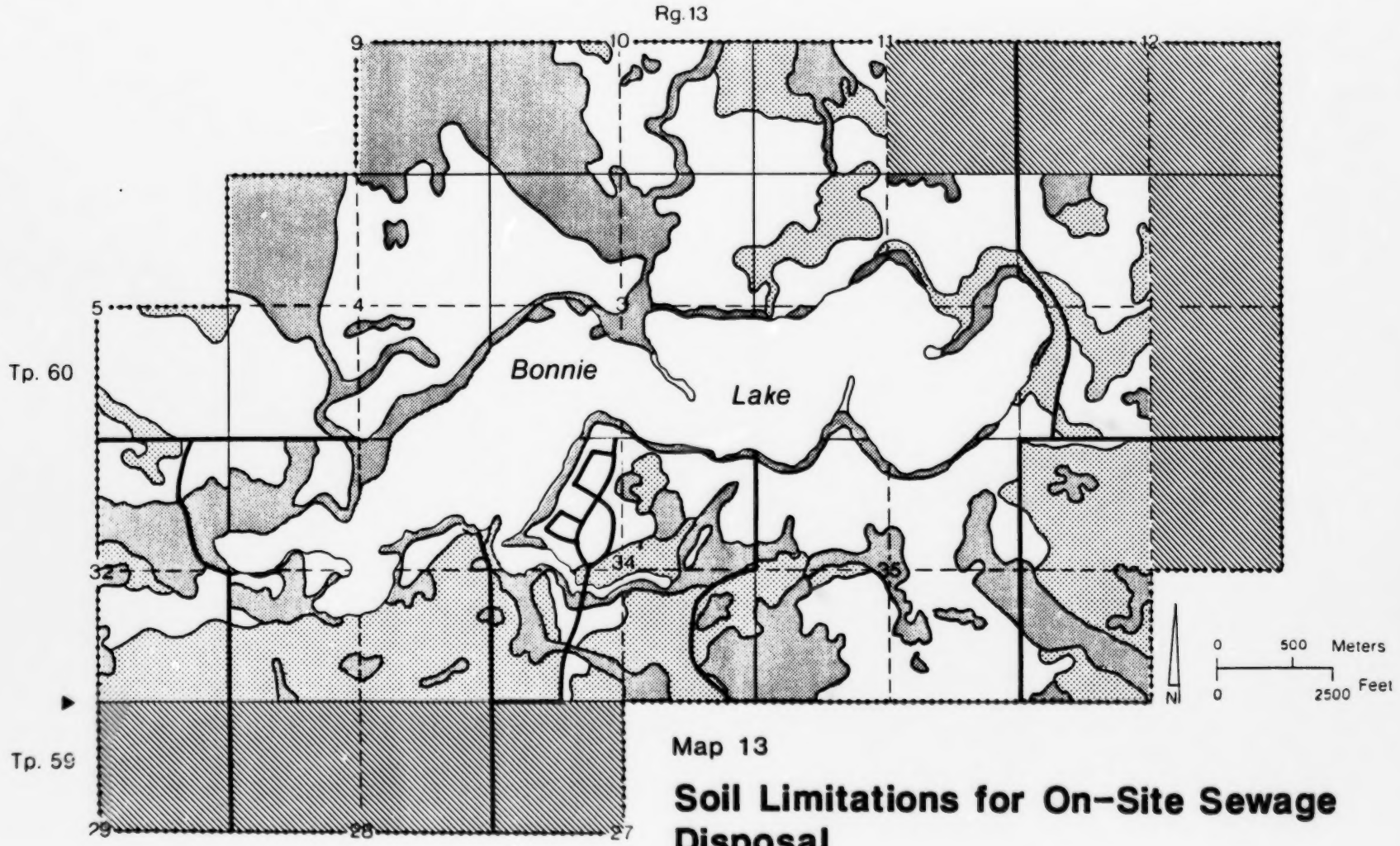


Map 12

Soil Limitations for Recreational Uses

- none to slight
- moderate
- severe
- no information available

Source Soil Survey and Land Suitability Evaluation
Pedology Consultants, for Alberta Environment

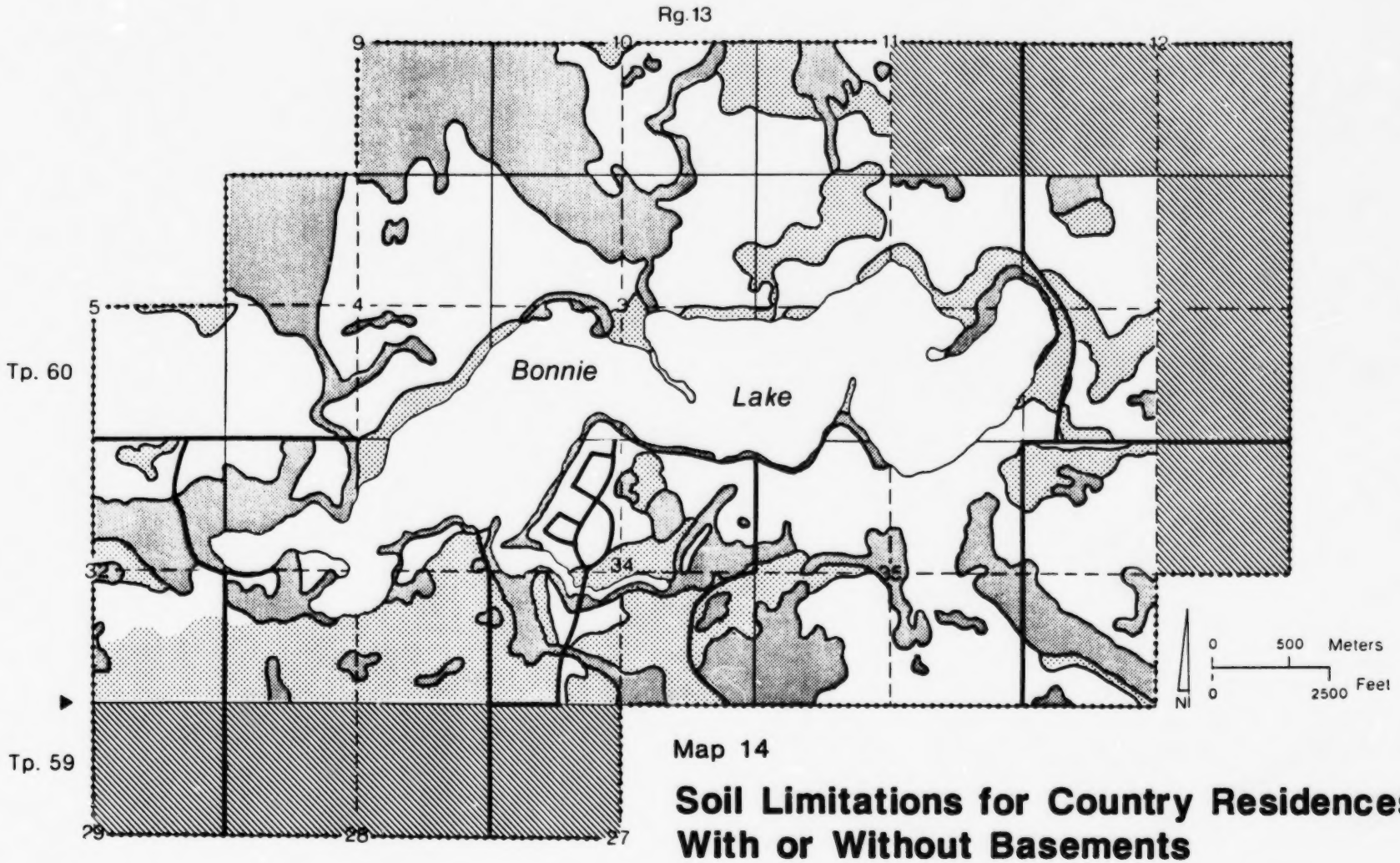


Map 13

Soil Limitations for On-Site Sewage Disposal

- none to slight
- moderate
- severe
- no information available

Source Soil Survey and Land Suitability Evaluation
Pedology Consultants, for Alberta Environm

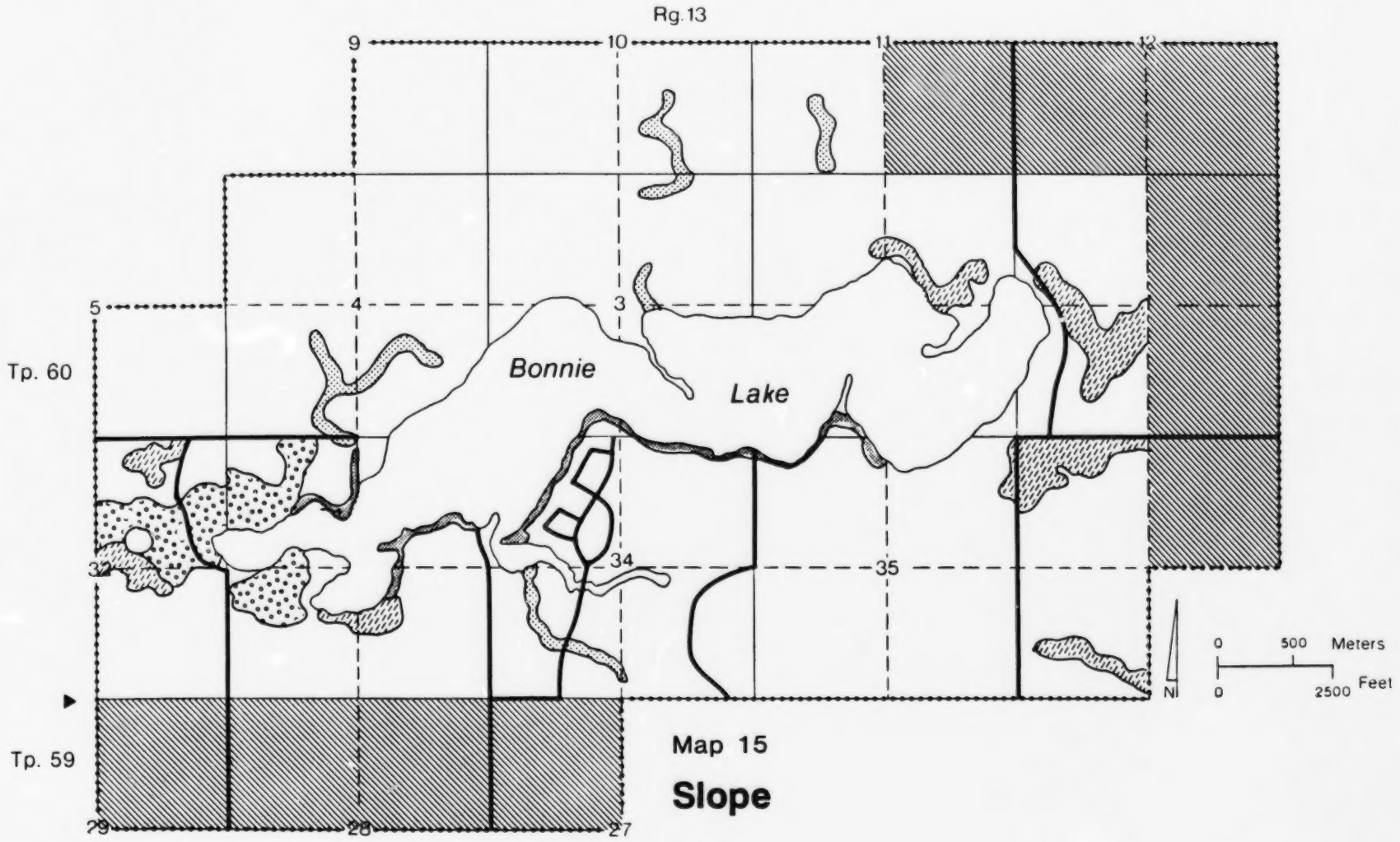


Map 14

Soil Limitations for Country Residences With or Without Basements

- none to slight
- moderate
- severe
- no information available

Source Soil Survey and Land Suitability Evaluation
Pedology Consultants, for Alberta Environment



Map 15

Slope

- 0-9%
- 9-15%
- > 15%
- stream channel
- steeply sloping banks adjacent lake
- no information available

Source: Soil Survey and Land Suitability Evaluation
Pedology Consultants, for Alberta Environme

Part C - Land Use and Development

CROWN LAND

Approximately 15% of the study area is crown land with only a small portion of this being lakefront property (Map 16). Crown land is publicly owned and is managed by Alberta Forestry, Lands and Wildlife. All of the crown land in the study area is used by groups or individuals who have agreements with Forestry, Lands and Wildlife. The agreements, called Public Land Dispositions, found in the area are as follows.

Grazing Lease - issued for a five or ten year period on lands not suitable for cultivation.

Farm Development Lease - issued for a ten year period for cultivation or cultivation and grazing, or a five year period if the option to purchase is included.

Recreational Lease - issued to municipalities or societies for a term of 21 years.

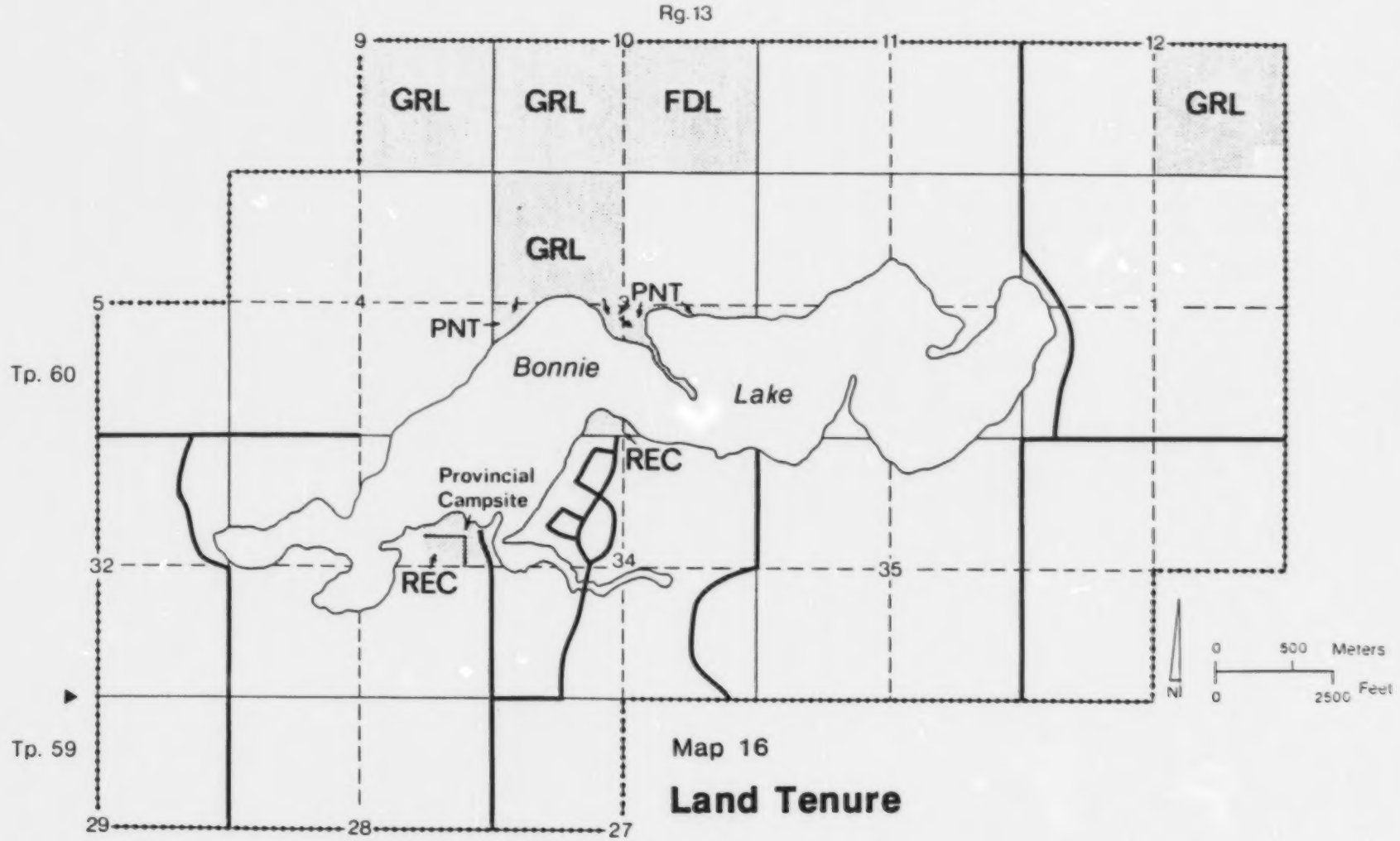
Scouts Canada Northern Region holds a 7.2 acre recreational lease for the SE and SW of Section 3 south of the lake. The lease is for a scout camp and leader training facility. The facility presently consists of a combined dining hall and kitchen with a seating capacity for 50 people. A combined bunkhouse and recreation hall are planned for the future. The scout camp is used throughout the year, with heaviest usage in the spring and fall (minimum usage 5 persons, maximum usage 40 persons). The camp is also used during the first weekend in June of every year as the site of a Community League fishing derby. Maximum usage averages 60 people.

The Village of Vilna holds a recreational lease on part of the NE Section 33. The Village has developed a baseball diamond on the site. The NE of Section 33 also contains a provincial campsite. The campsite is very well used and is full most weekends during the summer. People are often turned away. Facilities include 46 campsites, a day use area, 20 parking spaces, beach and boat launch. Campers also informally use the adjacent ball park for camping. The existing camping facility is small relative to camping demand.

The grazing leases and farm development lease are located north of the lake. The lakeshore in Section 3 is protected from certain types of development because of its potential for recreational use.

PATENTED LAND

The remaining land in the study area is patented. Most of the land south of the lake is cultivated (Map 17). Because of physical limitations, the area north of the lake is in bush with some cleared areas. Some of this area is used for livestock grazing. There is a major livestock operation located in Section 31. Livestock have direct access to the lake along the west and northwest shore. According to information provided by the District Agriculturist, it is estimated that there may be upwards of 900± cattle (including calves) grazing annually within the study area for at least some portion of the year. This number would fluctuate according to agricultural economics.



Map 16

Land Tenure

- ☐ crown
- ☐ patented
- GRL grazing lease
- FDL farm development lease
- REC recreation lease
- PNT protective notation

Source Public Lands Divi
Forestry, Lands and Wil

A 111 lot country residential development (Bonnie Lake Resort) is located on the west half of Section 34. Approximately 68% of the 111 lots have been purchased. Thirty six residences have been built and 26 sites have trailers. The beach has been developed and 8 large docks constructed.

The nine hole Vilna Golf Course is located in the Pt. of the W½ of SW Section 34. The County of Smoky Lake has a 4.2 acre campsite located in the SE of Section 2 southeast of the lake. The campsite is not developed and facilities are limited. Other land uses in the study area include a church in SE 12 and an industrial site in SE 32. The Industrial site is a Brenda Mines pump station. Single residences are also shown on Map 17.

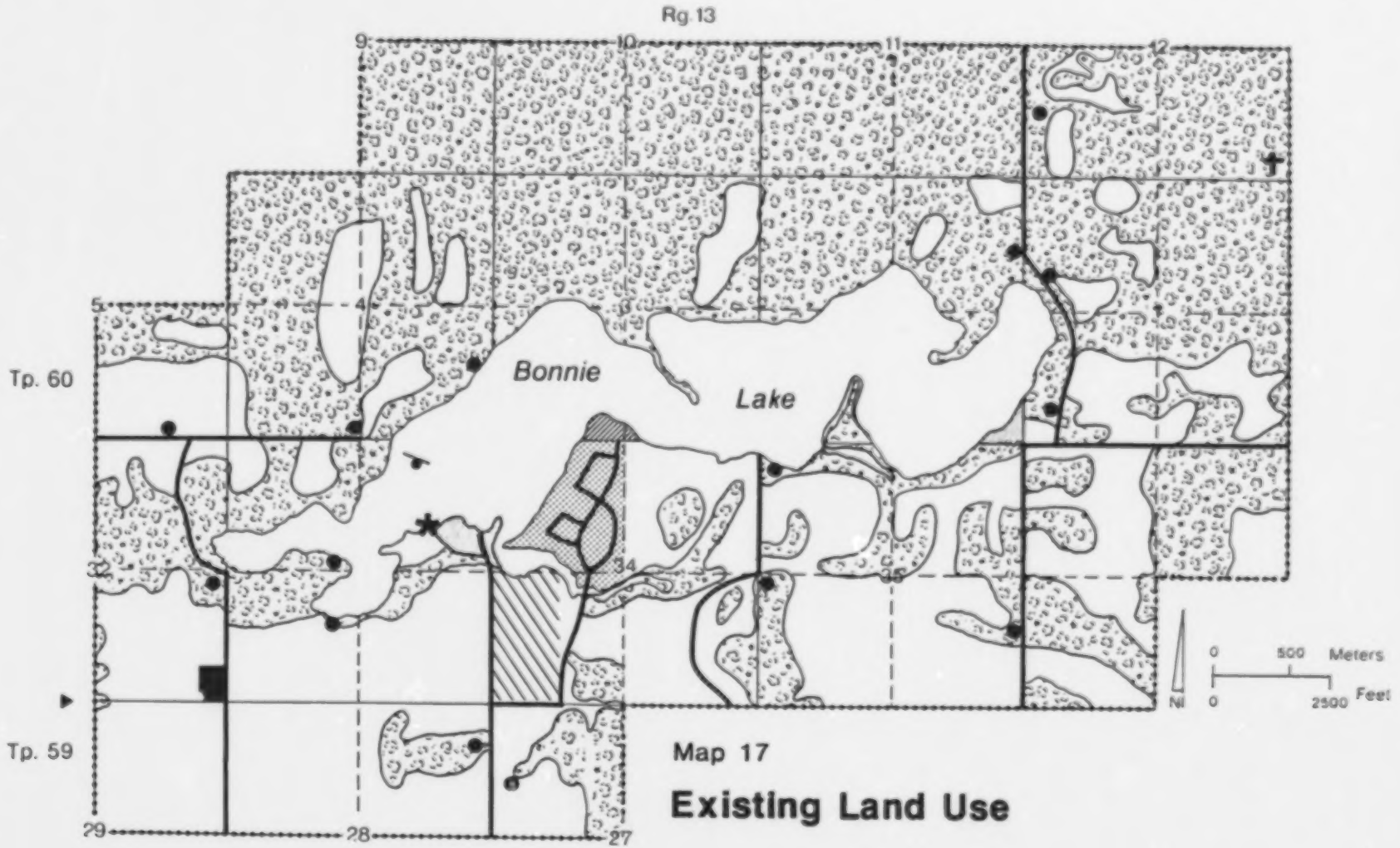
RECREATIONAL USE

By way of a general assessment, the surface of Bonnie Lake is used intensively for recreation. Fishing, boating, and water skiing are the main water based activities. There are many large motorboats on the lake. An active waterski club has established a ski jump in the northwest corner of the lake, across from Bonnie Lake Resort. The lake is particularly well used near the provincial campsite and the country residential subdivision.

More specific estimates of use intensities at Bonnie during the summer months were obtained from the results of the property owner questionnaire survey. As would be expected, the months of July and August experienced the highest intensities of mid-week and weekend usage (averages of 1.0 persons/residence during the mid-week period and averages of 2.2 persons/residence on weekends). The period of most intensive usage occurred during the Heritage Day long weekend in early August, when a peak of 4.3 persons/residence was reached.

An estimate of recreational use intensities at the provincial campsite has been calculated based on the assumption that campsite usage rates would correlate with cottage/residence usage rates during similar time periods. Given that the 46 camping stalls at the provincial campsite are full most weekends during the summer, it is estimated that there are ±100 campers (2.2 campers per stall) during an average summer weekend and ±200 campers (4.3 campers per stall) during a long holiday weekend.

Excluding the relatively limited usage of the Boy Scout camp and the unorganized County campground, it is estimated that there are approximately ±240 people at the lake during an average summer weekend. During a long holiday weekend, the number of people almost doubles to ±465.

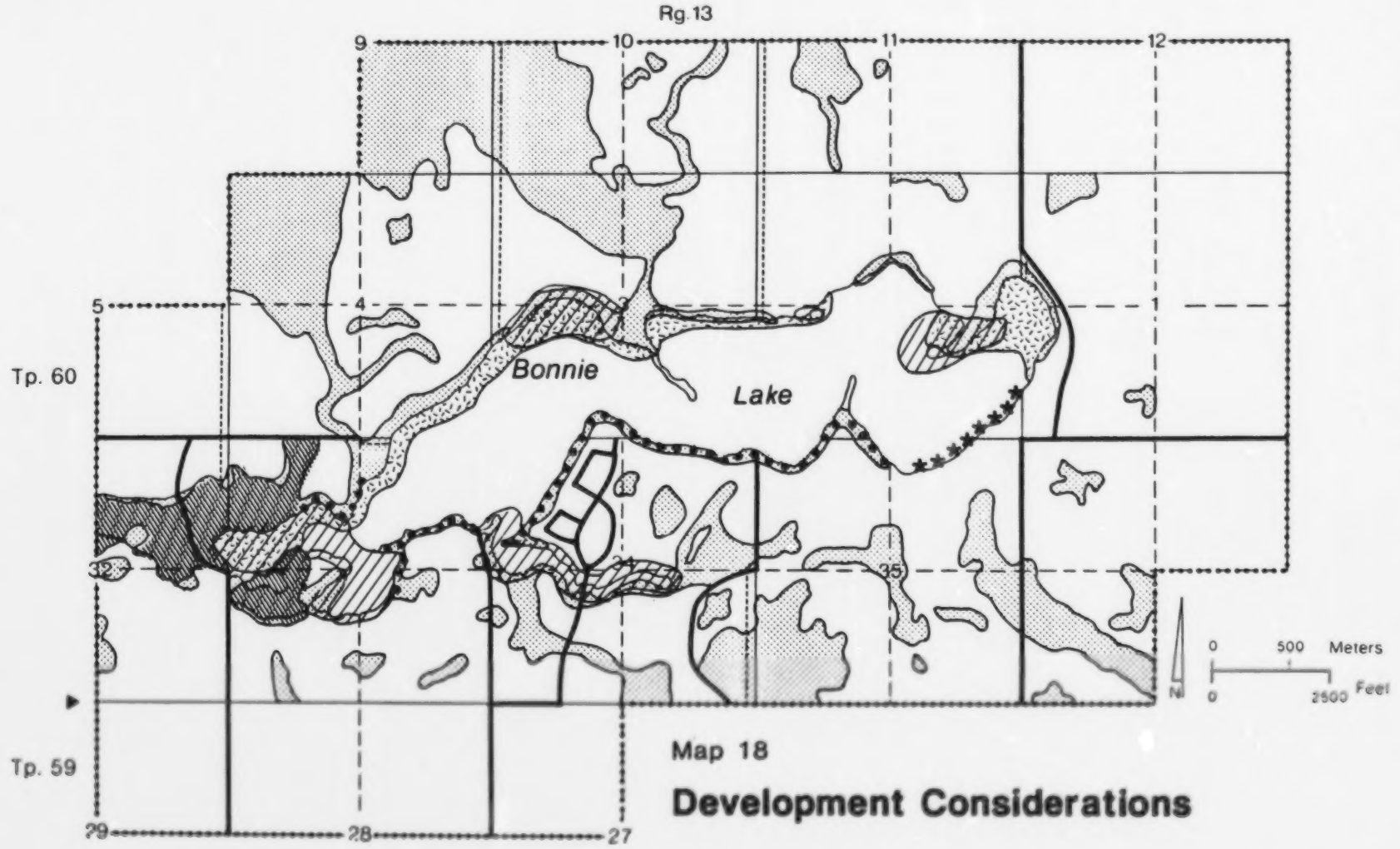


Map 17

Existing Land Use

- agriculture (cleared)
- undeveloped bush
- multi-lot residential
- public campground/park
- public golfcourse
- single residence
- church
- industrial (pumping station)
- ski jump
- institutional recreation (Boy Scouts)
- municipal water intake

Source: Aerial Photogra
and Field Inspec



Map 18

Development Considerations

- soil based development constraints
- significant habitat area
- extensive emergent aquatic vegetation
- steep backshore slopes >15%
- ••• steep shoreline slopes
- ** good beach area
- ------ physical access limitations (unopened road allowance)

SUMMARY OF LAKE USER QUESTIONNAIRE SURVEY

During the summer of 1986, a questionnaire was circulated to property owners in the study area, and to campers and day users at the provincial campsite. The purpose of this survey was to evaluate how the lake and its shorelands are used and viewed by cottagers, landowners, and the public at large.

A detailed statistical summary of the questionnaire along with copies of the questionnaire are included in the Appendices of this report. The summary which follows is intended to highlight the major lake related issues and concerns; and, to describe the quality of recreational experience as perceived by users of the lake.

a) Landowners
- -most residents (79%) are seasonal
- -some livestock have direct access to the lake
- -fertilizer is used on a number of fields
- -most respondents (77%) believe the quality of lake water to be fair to good
- -a slight majority (57%) perceive deficiencies in the physical condition of Bonnie Lake for recreational use (eg. weed growth, algae, fluctuating water levels)
- -most of the respondents (71%) use a boat and most of these are large boats
- -there is an average of 0.8 boats per cottage/residence at the lake
- -a large majority of residences (70%) believe there is no need for additional boat launching facilities
- -while only 9% perceive the lake surface to be overused on average weekends, 55% perceive the lake surface to be overused on long holiday weekends
- -only 34% perceived a need for additional public beach areas at the lake
- -45% of the respondents feel that certain locations of the lake should be zoned and regulated to control boating speeds, while 27% feel certain areas should be zoned to prohibit some or all types of boating (eg. swimming areas)
- -some respondents perceive a problem with low lake levels, all-terrain vehicles, boating congestion, and cattle accessing the lake
- -a large majority (87%) do not want additional cottage development or retail services at the lake
- -a slight majority (55%) of residents have rated the quality of fishing as fair to poor

b) Provincial Campground Users
- -90% of the campers live more than 60 miles away (note: local people use the lake during the week)
- -most people stay for a 2 or 3 day weekend
- -drinking water is most frequently brought from home
- -12% perceive the lake surface to be overused on average weekends, 28% perceive the lake surface to be overused on long holiday weekends
- -most respondents camp in a trailer, van, or motorhome; less than 20% use a tent
- -more than 80% of the respondents use a boat (mostly larger boats)
- -there is an average of 0.8 boats per campsite
- -fishing quality is rated fair to good by 88% of the campers
- -lake water quality is rated as being good by 78%
- -the majority (60%) believe more beach and day use areas are required

-existing boat launching facilities are adequate according to the vast majority of respondents (90%)
-most feel that boating activity should be restricted or controlled in certain areas of the lake
-78% do not want to see additional cottage development at Bonnie Lake
-70% feel that the existing recreational facilities are adequate
-a slight majority (56%) would like commercial services at the lake

Part D – Planning Issues/Lake Development Capacities

PLANNING ISSUES

Over the course of preparing the Bonnie Lake Management Study, five main planning issues or concerns have been identified. These issues have been outlined below and should be addressed in the Area Structure Plan for Bonnie Lake.

1) Lake Water Quality: Maintaining the highest standard of lake water quality possible is an important concern. To help achieve this, the amount of nutrients entering the lake should be minimized. One major source of nutrients is livestock waste. Livestock currently have direct access to the lake along the west and northwest shore. Nutrients are released into the lake when land within the watershed is disturbed or cleared. The use of fertilizers is another source of nutrients.

Even though a leaching pit or cesspool may be legally permitted by the Plumbing Inspections Branch of Alberta Labour, it can only be used to drain kitchen sink wastes, with a maximum drain line diameter of 1½ inches (3.8 cm). Experience with lake development has shown that these pits are often used to illegally drain bathtub, shower and even toilet waste water. In order to help minimize the risk of lake nutrient loading, the use of leaching pits or cesspools for kitchen sink waste/grey water disposal is strongly discouraged.

Another issue related to lake water quality is the issue of fluctuating lake levels, and its impact on fishing stocks and water quality. Present lake levels are at the low end of their natural historical fluctuation range. The County is currently working with Alberta Environment to determine the feasibility of stabilizing or raising lake levels.

2) Public Access to the Lake: The demand for public camping facilities at Bonnie Lake is greater than the supply available. The provincial campsite is full to capacity on most summer weekends and people are sometimes camping on land owned by the golf course. The County campsite is not as crowded but it is small and underdeveloped.

3) Additional Residential Development: The Lake Management Study was initiated in response to a proposal for a multi-lot residential development at the lake. The existing 111 lot country residential subdivision has a large number of unsold lots remaining. Most cottage owners, day users, and area residents stated in the questionnaire that they did not want additional cottage development at the lake. The major problem with more development is the increased intensity of lake use that would be generated.

4) Lake Surface Use: Results of the lake user survey indicate that the lake surface is perceived to be heavily used during peak use periods. As existing undeveloped residential lots are developed, lake surface usage will increase proportionally. Bonnie Lake has a large number of motorboats and skiers. Conflicts between skiers, swimmers, anglers, and small boats was identified as a problem. Most survey respondents feel that some type of boating restriction is required.

5) All Terrain Vehicles: The improper use of off-road ATV's is an issue and was mentioned many times in the questionnaire. Regulations in the Off-Highway Vehicle Act restricting the use of ATV's on public roadways/road right-of-ways; and, prohibiting careless driving, are not being followed. Although this is an issue for the R.C.M.P., it may be useful to address the problem in the Area Structure Plan.

EVALUATION OF LAKE DEVELOPMENT CAPACITIES

Basic Principles

One of the more frequently asked questions during the undertaking of a lake management study is ..."what is the development capacity of the lake?" Unfortunately, there is no simple, straight forward answer to this question. The reason for this is the fact that a lake can have a number of different development capacities, depending on which "limiting factor" is considered most important. Lake development capacity is typically a function of: bio-physical limitations to development; socio-perceptual limitations to development (ie. quality of recreational experience); or, economic limitations to development. The most critical limitation or "limiting factor" to lake development is ultimately determined by planning goals and objectives. These can reflect concern for either bio-physical, socio-perceptual or economic limitations.

Bonnie Lake

The following is an assessment of the lake development capacities of Bonnie Lake, based on the information contained in this report. Development capacity has been evaluated in terms of bio-physical limitations and socio-perceptual limitations. The development of planning goals and objectives for Bonnie Lake must ultimately establish the lake development capacity of Bonnie Lake, in conjunction with the major planning issues previously described.

a) Bio-physical limitations to development:

The major bio-physical development constraints and opportunities within the study area have been summarized on Map 18. These constraints and opportunities play a large role in determining the bio-physical development capacities of Bonnie Lake. A brief summary discussion of these development considerations follows:

1. Much of the north shoreline of the lake has extensive aquatic weed growth. Bays at the westerly and easterly ends of the lake are shallow and weedy. Significant fish and wildlife habitat coincide with much of this area. Water-based recreation development of the shoreline should be restricted in close proximity to these areas.

2. The steeply sloped backshore area west of the lake is not suitable for development due to potential erosion hazards. Similarly, the steep shoreline banks along the south shore of the lake should not be developed or disturbed. Erosion releases nutrients into the lake, and would negatively impact lake water quality.

3. The large areas of poorly drained organic soils scattered throughout the study area are not suited for recreational/residential development.

4. Physical lake access is limited within the study area, particularly north of the lake. It would be fairly costly to open or create new roads.

5. The southeast shore of Bonnie Lake is characterized by fairly good wet and dry beach features. This area of shoreline and the accompanying backshore area is physically suited to accommodate additional water-based recreation development. Development potential also exists at the unorganized County campsite.

6. A high standard of lake water quality is critical to maintaining a high quality water-based recreational experience. The 1983-84 lake water quality study has indicated that Bonnie Lake is sensitive to nutrient loading from agricultural activity, especially livestock watering. Additional well planned and controlled recreation development would have relatively little impact on lake water quality compared to agricultural developments.

b) Socio-perceptual limitations to development:

Socio-perceptual limitations to recreational development essentially relate to the quality of recreational experience at the lake. Studies done by Alberta Municipal Affairs of 9 lakes in northeastern Alberta clearly demonstrate that as the density of lake development increases, the number of lake users perceiving overuse of the lake surface increases. As lake overuse and related user conflicts increase, the quality of the water-based recreation experience usually declines.

The ideal maximum density of lake development appears to be between 8 and 10 acres of surface water per recreation unit, depending on the concentration, distribution, and type of lake development. Once density of lake development increases beyond this level, the majority of lake users will perceive overuse of the lake surface during peak use periods.

According to our calculations (see Appendix 2), the existing density of development at Bonnie Lake is about 8.9 acres/unit. Once all existing lots within Bonnie Lake Resort are developed, there will only be about 6.2 acres/unit. These calculations do not include the unorganized use occurring at the County campsite, or the irregular summer usage at the Boy Scout camp.

At present, 55% of the landowners and 28% of the campground users perceive overuse of the lake surface during peak use periods. As the number of undeveloped lots at Bonnie Lake Resort are developed, it is likely that the percentage of lake users perceiving overuse of the lake surface will increase accordingly. The large majority of lake users (88% of the landowners and 78% of the campground users) do not want to see additional cottage development at Bonnie Lake. Interestingly enough, 34% of the landowners and 60% of the campground users believed that additional day use/beach areas are required to meet recreational demand at the lake. Most lake users also agreed that some sort of restriction on boating activity in certain areas of the lake would assist in reducing the number of lake user conflicts.

Based on this albeit subjective perceptual information regarding the quality of recreation experience, it would appear that the socio-perceptual recreation carrying capacities of Bonnie Lake have been reached. Although there is a need for additional organized public camping at the lake, any major recreational developments would probably add to the already overcrowded situations during the peak use periods. The recreational development capcity of any recreational facility or lake environment must be reflective of the peak usage situations.

Appendices

APPENDIX 1. LAKE WATER QUALITY NUTRIENT LOADING BREAKDOWN - BONNIE LAKE

The following nutrient loading breakdown has been prepared by the Water Quality Control Branch of Alberta Environment.* The 1983-84 water quality sampling program conducted by Alberta Environment provided the basis for the nutrient breakdown analysis.

Nutrient Loading Breakdown:

"A simple measure of a lakes condition is the amount of algal growth it will sustain. This quantity is proportional to the level of plant nutrients that are supplied to that lake, and in particular, phosphorus. Unlike many other shallow lakes in central Alberta, Bonnie does not yet produce excessive levels of algal growth during late summer. It is only moderately productive, and based upon its average total phosphorus (32.9 mg/m^3) and phytoplankton chlorophyll a concentrations (7.2 mg/m^3), we would define its trophic state as intermediate between mesotrophic and eutrophic, or meso-eutrophic.

A knowledge of nutrient supply sources is critical to the prediction of the future trophic status of lakes. Based upon watershed studies and precipitation monitoring at other sites in central Alberta, we have formulated an annual phosphorus budget for Bonnie Lake. Surface runoff has been estimated from both agricultural and forested lands, as well as from "urban" development. Inputs via atmospheric deposition, and the internal load via sediment release have also been estimated. The loading breakdown is as follows:

External Sources	Agricultural Runoff	592 kg/yr (44%)
	Forested Runoff	276 kg/yr (20%)
	Urban Runoff	64 kg/yr (5%)
Atmospheric Sources	Atmospheric Deposition	114 kg/yr (8%)
Internal Sources	Sediment Release	308 kg/yr (23%)
Total "P" Loading		1354 kg/yr

We have also estimated that the development of 111 "cottages", 50% of which would use septic field systems, could contribute another 31 kg/yr."

*Correspondence with Dave Trew, Water Quality Control Branch, Alberta Environment, October, 1986.

APPENDIX 2. EVALUATION OF SOCIO-PERCEPTUAL RECREATIONAL DEVELOPMENT CAPACITY - BONNIE LAKE

1. Residential/Recreational Development* - 1986

   number of registered/approved residential lots = 111
   number of developed residential lots = 62
   number of developed campsites (provincial campsite) = 46

2. Density of Recreational Lake Development - 1986

   acres of lake surface per development unit (present) = 8.9 a/u
   acres of lake surface per development unit (existing potential = 6.2 a/u
   surface area of Bonnie Lake = 968 acres (392 ha)

Note: As the density of lake development increases, the number of acres of lake surface available to each recreation unit decreases.

3. Perceptions of Recreational Overuse/Development - 1986

landowners:

% of people perceiving lake surface overused = 9% during average summer weekend

% of people perceiving lake surface overused = 55% during long holiday weekend

campground users:

% of people perceiving lake surface overused = 12% during average summer weekend

% of people perceiving lake surface overused = 28% during long holiday weekend

APPENDIX 3.

LANDOWNER QUESTIONNAIRE
BONNIE LAKE MANAGEMENT STUDY
COUNTY OF SMOKY LAKE NO. 13
AUGUST, 1986

A. GENERAL INFORMATION

1. Name and address of property owner (for future mailout information).

   NAME_____

   ADDRESS_____

2. Are you a seasonal resident at Bonnie Lake?
   ( ) YES ( ) NO

   a) If YES, please indicate the approximate amount of time spent at Bonnie Lake annually.
   _____

   b) If YES, how long is your typical length of stay at Bonnie Lake?
   ( ) FOR THE DAY ( ) 3 NIGHTS
   ( ) OVERNIGHT ( ) OTHER _____
   ( ) 2 NIGHTS

3. Is this property used for agriculture?
   ( ) YES ( ) NO

   a) If YES, for livestock production please indicate:
   TYPE OF LIVESTOCK _____
   ESTIMATED NUMBER _____
   DO THEY HAVE ACCESS TO THE LAKE _____

   b) If YES, are crops grown on the property?
   ( ) YES ( ) NO
   And is fertilizer used?
   ( ) YES ( ) NO

4. Where do you obtain your drinking water while at Bonnie Lake?

( ) LAKE
( ) SPRING
( ) PRIVATE WELL
( ) COMMUNITY WELL
( ) BRING FROM HOME
( ) OTHER _____

5. What type of waste disposal system do you use for toilets?

( ) PIT TOILET
( ) SEPTIC TANK AND FIELD
( ) CHEMICAL TOILET
( ) PUMP-OUT TANK
( ) OTHER _____

6. How do you dispose of your solid wastes while at Bonnie Lake?

( ) LOCAL LANDFILL SITE
( ) TAKE BACK HOME
( ) BURN
( ) OTHER _____

7. How do you dispose of your sink wastes (eg. dishwater) while at Bonnie Lake?

( ) DRY WELL
( ) SEPTIC TANK
( ) PIT TOILET
( ) ON THE GROUND
( ) OTHER _____

8. Have you encountered problems with any of these disposal systems?

( ) YES
( ) NO

If YES, please specify problem.

_____

_____

B. RECREATION

9. If you own a cottage or recreate at Bonnie Lake, why did you choose this lake? Please rank your first four reasons in order of importance with 1 being the most important.
   ( ) FRIENDS OR RELATIVES HAVE HOMES/COTTAGES AT THE LAKE
   ( ) GOOD FISHING
   ( ) CLOSE TO GOOD HIGHWAY
   ( ) CLEAN LAKE WATER
   ( ) CLOSE TO HOME
   ( ) CLOSE TO TOWN FOR SUPPLIES
   ( ) NATURAL BEAUTY OF THE LAKE
   ( ) AVAILABILITY OF GOLF COURSE AND TENNIS COURTS
   ( ) GOOD BOATING
   ( ) AVAILABILITY OF LOTS
   ( ) OTHER _____

10. Do you see any deficiencies in the physical condition of Bonnie Lake for recreational use?
   ( ) YES ( ) NO ( ) DON'T KNOW

   If YES, please rank the three most serious problems with 1 being the most serious.
   ( ) ALGAE GROWTH/WATER POLLUTION
   ( ) FLUCTUATING WATER LEVELS
   ( ) SHORELINE WEED GROWTH
   ( ) WEED GROWTH IN OPEN AREAS OF LAKE
   ( ) OTHER _____

11. Please rank the four major recreational activities you engage in at Bonnie Lake in order of importance with 1 being the most important.

( ) SWIMMING	( ) HIKING
( ) FISHING	( ) GENERAL RELAXATION
( ) SAILING	( ) GOLF
( ) POWER BOATING	( ) TENNIS
( ) CANOEING	( ) PLAYGROUNDS
( ) WATERSKIING	( ) OTHER _____

12. Do you participate in recreational activities at Bonnie Lake during the winter season?
( ) YES ( ) NO

If YES, please indicate activities engaged in.

_____

_____

13. Do you use a boat at Bonnie Lake?
( ) YES ( ) NO

If YES, please indicate for each boat:

(1) TYPE _____ HORSEPOWER _____
(eg. canoe, motorboat)
(2) TYPE _____ HORSEPOWER _____
(3) TYPE _____ HORSEPOWER _____

14. Do you believe there is a need for more public boat launches on Bonnie Lake?
( ) YES ( ) NO ( ) DON'T KNOW

15. How would you rate the fishing at Bonnie Lake?
( ) EXCELLENT ( ) POOR
( ) GOOD ( ) DON'T KNOW
( ) FAIR

16. How would you rate the overall water quality of Bonnie Lake?
( ) EXCELLENT ( ) POOR
( ) GOOD ( ) DON'T KNOW
( ) FAIR

17. Do you think the water quality is:
( ) GETTING BETTER ( ) VARIES OVER TIME
( ) ABOUT THE SAME ( ) DON'T KNOW
( ) GETTING WORSE

18. How would you rate the use of the lake surface (boats, skiers, etc.) on an:

a) AVERAGE WEEKEND
( ) UNDER USED
( ) ADEQUATELY USED
( ) OVER USED
( ) DON'T KNOW

b) LONG HOLIDAY WEEKEND
( ) UNDER USED
( ) ADEQUATELY USED
( ) OVER USED
( ) DON'T KNOW

19. How would you rate the use of the public beach areas on an:

a) AVERAGE WEEKEND
( ) UNDER USED
( ) ADEQUATELY USED
( ) OVER USED
( ) DON'T KNOW

b) LONG HOLIDAY WEEKEND
( ) UNDER USED
( ) ADEQUATELY USED
( ) OVER USED
( ) DON'T KNOW

20. Do you believe there is a need for more beaches on Bonnie Lake?

( )YES ( ) NO ( ) DON'T KNOW

21. Do you feel that the use of the lake by boats should be:

( ) UNRESTRICTED
( ) ZONED TO CONTROL SPEED IN CERTAIN AREAS
( ) ZONED TO PROHIBIT ALL OR SOME TYPES OF BOATING IN CERTAIN AREAS
( ) DON'T KNOW

If you feel boating restrictions are required, please indicate type and location on the attached map.

_____

22. Are you aware of any lake use conflicts on Bonnie Lake?

( ) YES ( ) NO

If YES, please describe the conflicts here, and indicate their location on the attached map.

_____

_____

23. Do you feel that additional cottage development is desirable for Bonnie Lake?
( ) YES ( ) NO

24. Do you feel that commercial services (stores, gas stations, etc.) are desirable for Bonnie Lake?
( ) YES ( ) NO

If NO, why?

_____

_____

_____

_____

25. To the best of your recollection, please indicate in the spaces provided the number of people in your residence/cottage (family, friends, etc.) that used, expect to, or use, Bonnie Lake on any given day during the summer of 1986. Long weekends are marked with diagonal lines.

MAY

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

JUNE

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

JULY

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

AUGUST

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

SEPTEMBER

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

We appreciate the time you have taken to answer this questionnaire. Please use this space for any additional comments you may have concerning Bonnie Lake. Your comments will be of value to our study of the Bonnie Lake area.

APPENDIX 3.

DAY USER QUESTIONNAIRE
BONNIE LAKE MANAGEMENT STUDY
COUNTY OF SMOKY LAKE
AUGUST, 1986

SECTION A - GENERAL INFORMATION

1. How far is Bonnie Lake from your place of residence?

( ) 10 MILES OR LESS
( ) 11-20 MILES
( ) 21-60 MILES
( ) MORE THAN 60 MILES

2. Approximately how many times have you been to Bonnie Lake this year for recreational activities?

( ) 0
( ) 1 - 3
( ) 4 - 6
( ) 7 - 10
( ) MORE THAN 10

3. How long is your typical length of stay at Bonnie Lake?

( ) FOR THE DAY
( ) OVERNIGHT
( ) 2 NIGHTS
( ) 3 NIGHTS
( ) OTHER
(Please specify _____)

4. Where do you obtain your drinking water while at Bonnie Lake?

( ) LAKE
( ) SPRING
( ) BRING FROM HOME
( ) OTHER
(Please specify _____)

5. How do you dispose of your solid wastes while at Bonnie Lake?

( ) LITTER BARRELS AT LAKE
( ) TAKE BACK HOME
( ) ALBERTA TRANSPORTATION LITTER STOPS
( ) LOCAL LANDFILL SITE
( ) OTHER
(Please specify _____)

SECTION B - RECREATION

6. Why do you recreate at Bonnie Lake? Please rank your first four reasons in order of importance (eg. 1 for the most important reason, 2 for the second most important reason, etc.).

( ) FRIENDS OR RELATIVES HAVE HOMES OR COTTAGES AT LAKE
( ) GOOD FISHING
( ) GOLF COURSE
( ) CLOSE TO GOOD HIGHWAY
( ) CLEAN LAKE WATER
( ) CLOSE TO HOME
( ) CLOSE TO TOWN OR VILLAGE FOR SUPPLIES
( ) NATURAL BEAUTY OF LAKE
( ) AREA HAS ABUNDANT WILDLIFE AND WATERFOWL
( ) GOOD BEACHES
( ) GOOD BOATING
( ) OTHER (Please specify _____)

7. Do you see any deficiencies in the physical condition of Bonnie Lake for recreational use?

( ) YES ( ) NO ( ) DON'T KNOW

If YES, please rank the three most serious problems (eg. 1 for most serious problem, 2 for second most serious problem, etc.), and indicate their location on the attached map.

( ) ALGAE GROWTH
( ) FLUCTUATING WATER LEVELS
( ) SHORELINE WEED GROWTH
( ) WEED GROWTH IN OPEN AREAS OF LAKE
( ) OTHER (Please specify _____)

8. Please rank the four major recreational activities you engage in at Bonnie Lake, in order of importance (eg. 1 for most important, 2 for second most important, etc.).

( )	SWIMMING	( )	CANOEING	( )	GOLFING
( )	FISHING	( )	WATERSKIING	( )	GENERAL RELAXATION
( )	CAMPING	( )	HIKING	( )	OTHER
( )	SAILING	( )	PHOTOGRAPHY		(Please specify _____)
( )	POWER BOATING	( )	PICNICKING		

9. If you camp at Bonnie Lake what type of camping shelter do you use?

( ) TENT ( ) TRAVEL/TENT TRAILER ( ) OTHER
( ) VAN/TRUCK CAMPER ( ) MOTORHOME (Please specify _____)

10. Do you engage in recreational activities at Bonnie Lake during the winter?

( ) YES ( ) NO

If YES, please check the three major recreational activities engaged in, in order of importance (eg. 1 for most important, 2 for second most important, etc.).

( ) SNOWMOBILING ( ) SNOWSHOEING ( ) GENERAL RELAXATION
( ) HUNTING ( ) ICE FISHING ( ) OTHER
( ) CROSS-COUNTRY SKIING ( ) SKATING (Please specify _____)

11. Do you use a boat at Bonnie Lake?

( ) YES ( ) NO

If YES, please indicate type and number of boats used:

TYPE	NUMBER OWNED	HORSEPOWER
MOTORBOAT	_____	_____
ROWBOAT	_____	_____
CANOE	_____	_____
SAILBOAT	_____	_____

SECTION C - YOUR VIEWS

12. How would you rate the fishing at Bonnie Lake?

( ) EXCELLENT ( ) FAIR ( ) DON'T KNOW
( ) GOOD ( ) POOR

13. a) How would you rate the overall water quality of Bonnie Lake?

( ) EXCELLENT ( ) FAIR ( ) DON'T KNOW
( ) GOOD ( ) POOR

b) Do you think the water quality is:

( ) GETTING BETTER ( ) GETTING WORSE ( ) DON'T KNOW
( ) ABOUT THE SAME ( ) VARIES OVER TIME

14. On an average weekend, how would you rate the use of the:

a) Lake surface (boats, skiers, etc.)?

( ) UNDER USED ( ) OVER USED ( ) DON'T KNOW
( ) ADEQUATELY USED

b) Public beach areas?

( ) UNDER USED ( ) OVER USED ( ) DON'T KNOW
( ) ADEQUATELY USED

15. On long holiday weekends, how would you rate the use of:

a) Lake surface (boats, skiers, etc.)?

( ) UNDER USED ( ) OVER USED ( ) DON'T KNOW
( ) ADEQUATELY USED

b) Public beach areas?

( ) UNDER USED ( ) OVER USED ( ) DON'T KNOW
( ) ADEQUATELY USED

16. Do you feel there is a need for more beaches and day use areas on Bonnie Lake?

( ) YES ( ) NO ( ) DON'T KNOW

17. Do you feel that existing boat launch facilities are sufficient?

( ) YES ( ) NO ( ) DON'T KNOW

18. Do you feel that the use of the lake by boats should be:
    ( ) UNRESTRICTED
    ( ) ZONED TO CONTROL SPEED IN CERTAIN AREAS
    ( ) ZONED TO PROHIBIT ALL OR SOME TYPES OF BOATING IN CERTAIN AREAS
    ( ) DON'T KNOW

    If you feel boating restrictions are required, please indicate type and location on the attached map.

19. Do you feel that the existing recreational facilities at Bonnie Lake are adequate?
    ( ) YES ( ) NO ( ) DON'T KNOW

    If NO, why?

    _____

    _____

20. Are you aware of any land use conflicts occuring in the Bonnie Lake area?
    ( ) YES ( ) NO

    If YES, please describe the conflicts here, and indicate their location on the attached map.

    _____

    _____

21. Are you aware of any lake use conflicts on Hanmore Lake?
    ( ) YES ( ) NO

    If YES, please describe the conflicts here, and indicate their location on the attached map.

    _____

    _____

22. Do you feel that additional cottage development is desirable for Bonnie Lake?
( ) YES ( ) NO

23. Do you feel that commercial services (stores, gas stations, etc.) would be desirable for Bonnie Lake?
( ) YES ( ) NO

If NO, why?

_____

_____

24. We appreciate the time you have taken to answer this questionnaire. Please use this space for any additional comments you may have concerning Bonnie Lake. Your comments will be of value to our study of the Bonnie Lake area.

APPENDIX 4. LANDOWNER SURVEY QUESTIONNAIRE RESULTS BONNIE LAKE MANAGEMENT STUDY

SECTION A - GENERAL INFORMATION

2a. SEASONAL RESIDENCY
(N = 68)

SEASONAL RESIDENT	PERCENT
Yes	79
No	21

2b. TYPICAL LENGTH OF STAY
(N = 60)

LENGTH	PERCENT
For the Night	7
Overnight	7
Two Nights	35
Three Nights	17
Other	35

3. AGRICULTURAL USE OF PROPERTY
(N = 67)

AGRICULTURAL USE	PERCENT
Yes	30
No	70

3a. NUMBER OF RESPONDENTS RAISING LIVESTOCK = 7

3b. CROP PRODUCTION ON AGRICULTURAL PROPERTY
(N = 21)

CROPS GROWN	PERCENT
Yes	76
No	24

3b. FERTILIZER USE ON AGRICULTURAL PROPERTY
(N = 21)

FERTILIZER USED	PERCENT
Yes	43
No	57

4. SOURCE OF DRINKING WATER
(N = 89)

SOURCE	PERCENT
Lake	2
Spring	0
Private Well	21
Community Well	17
Bring from Home	56
Other	5

5. TOILET WASTE DISPOSAL
(N = 70)

METHOD	PERCENT
Pit Toilet	69
Septic Field	7
Chemical Toilet	1
Pump Out Tank	20
Other	3

6. SOLID WASTE DISPOSAL
(N = 71)

METHOD	PERCENT
Local Landfill Site	42
Take Back Home	37
Burn	16
Other	6

7. SINK WASTE DISPOSAL
(N = 66)

METHOD	PERCENT
Dry Well	12
Septic Tank	23
Pit Toilet	26
On the Ground	32
Other	8

8. PROBLEMS WITH WASTE DISPOSAL SYSTEMS
(N = 59)

PROBLEMS	PERCENT
Yes	7
No	93

Types of waste disposal problems:
- inconvenient to carry garbage bags home
- garbage bins should be located nearby

SECTION B - RECREATION

9. REASONS FOR CHOOSING BONNIE LAKE
(N = 36)

REASONS	RANK WEIGHT	RANK
Natural Beauty of Lake	220	1
Clean Lake Water	175	2
Availability of Golf/Tennis	150	3
Close to Highway	135	4
Close to Home	115	5
Other	112	6
Friends/Relatives	105	7
Good Boating	95	8
Good Fishing	93	9
Availability of Lots	84	10
Close to Town for Supplies	80	11

10. PHYSICAL DEFICIENCIES IN LAKE
(N = 67)

DEFICIENCIES	PERCENT
Yes	57
No	25
Don't Know	18

Types of deficiencies considered most serious:
- shoreline weed growth
- weed growth in open areas of lake
- algae growth
- water pollution
- fluctuating lake water levels

11. IMPORTANT RECREATION ACTIVITIES
(N = 53)

ACTIVITY	RANK WEIGHT	RANK
General Recreation	360	1
Fishing	300	2
Swimming	265	3
Golf	225	4
Waterskiing	135	5
Playgrounds	100	6
Power Boating	83	7
Tennis	45	8
Hiking	40	9
Canoeing	35	10
Skiing	30	11
Other		12

12. WINTER RECREATION ACTIVITIES
(N = 67)

WINTER USE	PERCENT
Yes	49
No	51

TYPE OF WINTER ACTIVITIES

ACTIVITY	RANK
Ice Fishing	1
Cross-Country Skiing	2
Snowmobiling	3
Skating	4
Walking	5
General Relaxation	6
ATV Use	7
Trapping	8

13. BOAT USE
(N = 69)

BOAT TYPE	PERCENT
Yes	71
No	29

BOAT TYPE/NUMBER
(N = 49)

BOAT TYPE	NUMBER
Motorboat	48
Rowboat	2
Canoe	7
Sailboat	1

MOTORBOAT HORSEPOWER
(N = 48)

HORSEPOWER	NUMBER	PERCENT
0-19	17	35
19-39	8	17
40-59	1	2
60-79	3	6
80-99	8	17
>100	11	23

14. NEED FOR ADDITIONAL BOAT LAUNCHES
(N = 69)

NEED	PERCENT
Yes	15
No	70
Don't Know	15

15. QUALITY OF FISHING
(N = 69)

RATING	PERCENT
Excellent	4
Good	29
Fair	47
Poor	6
Don't Know	14

16. LAKE WATER QUALITY
(N = 69)

RATING	PERCENT
Excellent	4
Good	42
Fair	35
Poor	4
Don't Know	15

17. CHANGES IN LAKE WATER QUALITY
(N = 59)

TYPE OF CHANGE	PERCENT
Getting Better	1
About the Same	44
Getting Worse	20
Varies Over Time	10
Don't Know	25

18(a). LAKE SURFACE USE - AVERAGE WEEKEND
(N = 64)

LEVEL OF USE	PERCENT
Under Used	6
Adequately Used	73
Over Used	9
Don't Know	11

18(b). LAKE SURFACE USE - LONG WEEKEND
(N = 65)

LEVEL OF USE	PERCENT
Under Used	2
Adequately Used	25
Over Used	55
Don't Know	17

19(a). PUBLIC BEACH USE - AVERAGE WEEKEND
(N = 66)

LEVEL OF USE	PERCENT
Under Used	11
Adequately Used	64
Over Used	12
Don't Know	14

19(b). PUBLIC BEACH USE - LONG WEEKEND
(N = 66)

LEVEL OF USE	PERCENT
Under Used	2
Adequately Used	32
Over Used	50
Don't Know	17

20. NEED FOR MORE BEACHES
(N = 70)

NEED	PERCENT
Yes	34
No	54
Don't Know	11

21. NEED FOR MORE BOATING RESTRICTIONS
(N = 74)

RESTRICTION	PERCENT
Unrestricted	11
Speed Controls*	45
Boating Type Controls*	27
Don't Know	18

*Comments show a desire to restrict boating along the shore at Bonnie Beach Resort and the Provincial Campground. It was suggested that skiers keep to the centre of the lake and fishermen to the edges.

22. EXISTENCE OF LAKE USE CONFLICTS
(N = 63)

CONFLICTS	PERCENT
Yes*	21
No	79

*Examples cited include loud parties, low lake levels, ATV usage, cattle access to lake, congestion of campgrounds.

23. ADDITIONAL COTTAGE DEVELOPMENT
(N = 60)

DESIRABLE	PERCENT
Yes	13
No	87

24. COMMERCIAL SERVICES AT LAKE
(N = 61)

DESIRABLE	PERCENT
Yes	13
No*	87

*Reasons not desirable: Vilna is nearby, lake environment would become commercialized.

25. RESIDENCE USE RATES (Persons Per Residence)

MAY

S	M	T	W	T	F	S
				1 .20	2 .60	3 1.60
4 1.40	5 .10	6 .10	7 .10	8 .04	9 .70	10 1.40
11 1.30	12 .07	13 .10	14 .07	15 .07	16 .80	17 4.10
18 4.00	19 8.40	20 .20	21 .20	22 .20	23 .70	24 1.40
25 1.40	26 .04	27 .04	28 .07	29 .10	30 .80	31 1.80

JUNE

S	M	T	W	T	F	S
1 1.50	2 .10	3 .10	4 .10	5 .10	6 .70	7 2.30
8 2.00	9 .20	10 .04	11 .04	12 .04	13 .80	14 2.00
15 2.00	16 .10	17 .10	18 .10	19 .10	20 .80	21 2.40
22 1.80	23 .10	24 .10	25 .20	26 .20	27 1.10	28 3.40
29 2.10	30 2.00					

JULY

S	M	T	W	T	F	S
		1 3.50	2 1.00	3 1.00	4 1.40	5 2.00
6 2.00	7 1.30	8 1.30	9 1.10	10 1.20	11 2.10	12 2.80
13 2.40	14 .80	15 .80	16 .90	17 .90	18 1.60	19 2.30
20 1.80	21 .60	22 .60	23 .70	24 .70	25 1.50	26 2.10
27 2.00	28 .70	29 .80	30 .80	31 .70		

AUGUST

S	M	T	W	T	F	S
					1 2.40	2 4.00
3 4.30	4 4.80	5 1.00	6 .80	7 .80	8 1.50	9 2.50
10 2.60	11 .70	12 .70	13 .80	14 .70	15 1.40	16 2.20
17 2.30	18 1.00	19 1.10	20 1.20	21 1.00	22 1.50	23 2.40
24 1.80	25 .50	26 .50	27 .50	28 .50	29 1.10	30 2.90 31 3.50

SEPTEMBER

S	M	T	W	T	F	S
	1 2.60	2 .09	3 .09	4 .09	5 .30	6 .90
7 .90	8 .09	9 .07	10 .07	11 .07	12 .70	13 1.50
14 1.10	15 .07	16 .04	17 .04	18 .04	19 .50	20 1.30
21 .90	22 .04	23 .04	24 .04	25 .10	26 .30	27 1.30
28 1.10	29 .04	30 .04				

APPENDIX 4. DAY USER SURVEY QUESTIONNAIRE RESULTS BONNIE LAKE MANAGEMENT STUDY

SECTION A - GENERAL INFORMATION

1. DISTANCE FROM PLACE OF RESIDENCE
(N = 27)

DISTANCE	PERCENT
10 Miles or Less	4
11 to 20 Miles	0
21 to 60 Miles	5
More than 60 Miles	91

2. FREQUENCY OF VISITS
(N = 27)

NUMBER OF VISITS	PERCENT
None	0
1 to 3	65
4 to 6	27
7 to 10	4
More than 10	4

3. LENGTH OF VISIT
(N = 27)

LENGTH OF STAY	PERCENT
For the Day	2
Overnight	5
2 Nights	33
3 Nights	42
Other (1-2 Weeks)	18

4. SOURCE OF DRINKING WATER
(N = 27)

SOURCE	PERCENT
Lake	12
Spring	12
Bring From Home	76
Other	0

5. SOLID WASTE DISPOSAL
(N = 27)

METHOD	PERCENT
Litter Barrels	85
Take Home	15

SECTION B - RECREATION

6. REASONS FOR CHOOSING BONNIE LAKE
(N = 22)

REASONS	RANK WEIGHT	RANK
Good Fishing	220	1
Good Beaches	125	2
Natural Lake Beauty	108	3
Golf Course	95	4
Good Boating	90	5
Clean Lake Water	82	6
Close to Home	62	7
Friends/Relatives at Lake	52	8
Abundant Wildlife	30	9
Close to Highway	25	10
Close to Town	20	11
Other (nice campsite)	12	12

7. PHYSICAL DEFICIENCIES IN LAKE
(N = 27)

DEFICIENCIES	PERCENT
Yes	33
No	65
Don't Know	12

Types of deficiencies considered most serious:

- algae growth
- shoreline weed growth
- rocks in boat launch area
- crowding
- lack of pay phones and rental concessions
- not enough camping stalls

8. IMPORTANT RECREATION ACTIVITIES
(N = 27)

ACTIVITY	RANK WEIGHT	RANK
Fishing	248	1
Swimming	185	2
Camping	173	3
Waterskiing	115	4
General Relaxation	95	5
Golfing	72	6
Picnicking	55	7
Power Boating	40	8
Hiking	25	9

9. TYPE OF CAMPING SHELTER USED
(N = 34)

TYPE OF SHELTER	PERCENT
Travel/Tent Trailer	29
Van/Truck Camper	26
Motor Home	25
Tent	18
Other	3

10. WINTER RECREATION ACTIVITIES
(N = 27)

WINTER USE*	PERCENT
Yes	62
No	38

*Activities listed were ice fishing, general relaxation, snowshoeing and skating.

11. BOAT USE
(N = 27)

BOAT USE	PERCENT
Yes	85
No	15

BOAT TYPE
(N = 23)

BOAT TYPE	PERCENT
Motorboat	23
Rowboat	0
Canoe	0
Sailboat	0

MOTORBOAT HORSEPOWER
(N = 23)

HORSEPOWER	NUMBER	PERCENT
0-19	6	26
19-39	2	9
40-59	2	9
60-79	5	21
80-99	2	9
>100	6	26

SECTION B - RECREATION

12. QUALITY OF FISHING
(N = 26)

RATING	PERCENT
Excellent	0
Good	46
Fair	42
Poor	12
Don't Know	0

13a. LAKE WATER QUALITY
(N = 27)

RATING	PERCENT
Excellent	7
Good	78
Fair	15
Poor	0
Don't Know	0

13b. CHANGES IN LAKE WATER QUALITY
(N = 27)

TYPE OF CHANGE	PERCENT
Improving	4
About the Same	70
Getting Worse	4
Varies Over Time	4
Don't Know	18

14a. LAKE SURFACE USE - AVERAGE WEEKEND
(N = 25)

LEVEL OF USE	PERCENT
Under Used	0
Adequately Used	76
Over Used	25
Don't Know	5

14b. PUBLIC BEACH USED - AVERAGE WEEKEND
(N = 25)

LEVEL OF USE	PERCENT
Under Used	0
Adequately Used	70
Over Used	25
Don't Know	5

15a. LAKE SURFACE USE - LONG WEEKEND
(N = 26)

LEVEL OF USE	PERCENT
Under Used	0
Adequately Used	68
Over Used	28
Don't Know	4

15b. PUBLIC BEACH USE - LONG WEEKEND
(N = 26)

LEVEL OF USE	PERCENT
Under Used	0
Adequately Used	57
Over Used	43
Don't Know	0

16. NEED FOR MORE BEACHES
(N = 27)

NEED	PERCENT
Yes	60
No	35
Don't Know	5

17. ARE EXISTING BOAT LAUNCH FACILITIES SUFFICIENT
(N = 27)

EXISTING FACILITIES SUFFICIENT	PERCENT
Yes	90
No	4
Don't Know	6

18. NEED FOR MORE BOATING RESTRICTIONS
(N = 27)

RESTRICTION	PERCENT
Unrestricted	35
Speed Controls	48
Boating Type Controls	10
Don't Know	7

19. ADEQUACY OF EXISTING RECREATION FACILITIES
(N = 27)

FACILITIES ADEQUATE	PERCENT
Yes	70
No*	30

*Examples Cited: not enough facilities; pay phone needed; need more camping area; need larger and wider camping stalls; need to make reservations.

20. AWARENESS OF LAND USE CONFLICTS
(N = 27)

CONFLICTS	PERCENT
Yes*	10
No	90

*Examples Cited: noisy generators.

21. AWARENESS OF LAKE USE CONFLICTS
(N = 27)

CONFLICTS	PERCENT
Yes	0
No	100

22. ADDITIONAL COTTAGE DEVELOPMENT
(N = 27)

DESIRABLE	PERCENT
Yes	22
No	78

23. COMMERCIAL SERVICES AT LAKE
(N = 27)

DESIRABLE	PERCENT
Yes	56
No	44

ADDITIONAL COMMENTS (not edited)

1. post general information
   -placing tents
   -stalls narrow
   -number of people per stall
2. rocks should be cleaned out of boating area along beach
3. mark the rock between the island and north shore
4. boat docking area should be cleared of rocks
5. boat docking facility inadequate - rocks in the water
6. more campstalls
7. more camping stalls - otherwise excellent
8. more campstalls
9. more camping stalls
10. good area - price is right
11. very nice
12. larger stalls
13. remove rocks from shoreline - boat launch
14. more camping stalls/walkways/beach/boat launch/outhouses
15. boat docking facilities are lacking
16. more stalls
17. mark hazardous rocks
18. too crowded in sites where 3 R.V.'s are permitted
19. more parking stalls
20. cut the grass
21. wider stalls - 3 stalls to 2 fire pits
22. skiers a problem - big power boats near fishing should slow down, wider/larger stalls, nature films
23. power, plug-ins and showers
24. mark hazardous rocks